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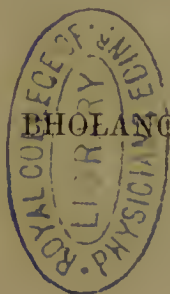


A NEW SYSTEM OF MEDICINE,  
ENTITLED  
RECOGNIZANT MEDICINE;  
OR, THE  
STATE OF THE SICK.

BY

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TO

FREDERIC JOHN MOUAT, Esq., M.D., F.R.C.S. Eng.,

*Fellow and Member of the Senate of the University of Calcutta,  
Local Government Inspector,  
&c., &c.*

IN TOKEN OF ADMIRATION OF HIS TALENTS, RESPECT FOR HIS DISTIN-  
GUISHED PUBLIC SERVICES IN INDIA,

AND APPRECIATION OF HIS CONSTANT KINDNESS AND ENCOURAGEMENT,

*THIS WORK IS DEDICATED,*

BY

HIS FORMER PUPIL AND OBLIGED FRIEND,

*THE AUTHOR.*



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## P R E F A C E.

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It would seem as a matter of fact to be much easier to write a book than in some cases to prepare a preface to it. The writer has to explain in a few words his theme and his justification in venturing to submit that scheme to the public, or, it may be, to his fellow craftsmen. There is a well known Indian proverb to the effect that "a seed which is thirteen feet long cannot be very easily and conveniently enclosed in a fruit which is only twelve feet long." And herein is the author's difficulty, inasmuch as the subject being a new one, and rather long in that way, he does not know how the whole subject could exactly be compressed within the few stereotyped lines of a preface. There appears, however, one way of getting over the difficulty, and that by means of a preface which should just skim the surface (the author having sufficiently indicated the general scope of the work in the introduction), leaving the reader who may honour the treatise with an attentive perusal to discover for himself the actual nature of the substratum.

Now, what is the surface, and what does an impartial survey of it teach? The surface or preface, then, is a deep conviction in the mind of the author,

and the same conviction must more or less be felt by all conscientious and thoughtful men in the profession who have or have had much to do with the management of the sick, that our present practice is anything but satisfactory ; the consequence is that when we meet at the bedside of a patient we are seldom agreed in some of the most essential points as regards either the doctrine or the work we are immediately called upon to do. We may know the so-called particular diseases and their symptoms, but the diseases as they are taught at present are, so to speak, merely so many concentric or collective foci of symptoms, and in that sense, strictly considered, complex symptoms themselves, and therefore fundamentally as regards the *state of the sick* they are not diseases at all, but simply expressions of the actual condition of sickness.

This, however loath we may be disposed to acknowledge it, is what actually occurs at the bedside at present. We are unable clearly to perceive the relations of the symptoms with the actual state of the patient ; hence if we venture to express an opinion at all, it is either to blindly submit to authority, or in the event of our venturing to reason on our own account, to differ from each other, no two physicians ever agreeing on the whole in any given case that may be simultaneously presented to them. Hence the common saying, "Doctors differ." Still it is curious that they never differ about their anatomy, about the properties of air, water, soil, climate, heat, light, electricity, &c. Their *materia medica* is well

established, and there is no difference of opinion as to the drugs, so far at least as the quantities or doses in which they have hitherto been exhibited. Their physiology is good; their chemistry, botany, and zoology are exact and well advanced sciences; and hygiene and morbid anatomy are highly creditable to the century. Why, then, it may be reasonably asked, do medical men, whose art is based upon these exact sciences, differ about disease, to the elucidation of which it is to be supposed this collective knowledge is applied? The mathematicians on a given proposition or sum are not disagreed, nor are the engineers, the naval officers, the artisans, the painters, photographers, and other professions on questions of principle or practice as regards their work or their duties respectively.

Is the ill-fated science of medicine the only one doomed to mysticism, doubts, and disputes? Is the medical profession, the central light, so to speak, of all scientific light—for there can be no doubt that a properly educated physician is one of the most learned men in the world—the single one that cannot see itself in its true position in the blaze of its own light? Seriously speaking, *why* should it be? And it is the *why* here, and how things could be still remedied, which I have humbly presumed to explain and suggest in these pages, and I need scarcely say that it is the bounden duty of all conscientious medical men, instead of condemning or decrying what may appear to them strange or opposed to accepted views in what the author has pro-

posed, either to uphold his views or improve upon them if possible, or to endeavour to discover an entirely new method, in order not only to timely extricate ourselves from the deep groove in which we have confessedly been long moving, but to raise medicine itself to the rank of something like an exact and rational science, which it is not now. It is the *state of the sick* we have thoroughly to study and comprehend. In other words, we have to cultivate what we have called "Recognisant Medicine," in contradistinction to the ordinary or "Cognisant Medicine," which comprises the sole curriculum of study for our students at the present day.

There should be, in fact, a special chair of Recognisant Medicine in every medical school before the education of our youth can be considered either safe or complete.

Those who desire to see how the different schools of practitioners—hydropathists, homœopathists, allopathists, &c.—can be reconciled with each other, should read the author's brochure on the "Principles of Rational Therapeutics."

BELLE VUE HOTEL,  
21, NORFOLK STREET, STRAND,  
October 30th, 1877.

## INTRODUCTION.

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THE main object of medicine is undoubtedly the prevention of premature death, and of avoidable human suffering from disease and violence generally. Rational medicine endeavours to attain these ends alone, and is studied, as it should be, in such a manner as to obtain the greatest possible result by the least complicated, and happiest combination of means at our disposal.

The department of science to which we usually apply for this purpose embraces a variety of independent studies, which we separately cultivate and master, in order to perfect ourselves, and in order to a safe comprehension of the doctrines of life in its contentions with the evils to which it is liable. They refer to the knowledge of the human machine itself (anatomy); of its functions (physiology); of them both when deranged (pathology), including the practice of physic, surgery, and midwifery; of the instruments of our profession (materia medica); and lastly, whence such tools are obtained, zoology, botany, and chemistry. To this, already a long list, we should add hygiene.

Such is the curriculum through which every conscientious professor of medicine must, or ought to completely pass before he ventures into practice; but with all this array of learning on his side, we do not hesitate to express our conviction that his education remains still materially defective in many respects, and demands considerable improvement. These defects even a careless observer will not fail to discover to

arise greatly from the imperfect and faulty method at present pursued in investigating and treating disease.

With a view to gather some conception of the kind of instruction now imparted to the student of medicine, we cannot do better than slightly glance over the subjects to which his attention is directed during the term of his pupilage in any of the great medical institutions of this boasted century.

After a few preliminary observations on the general nature of his subject, the professor of medicine begins his course, generally, by introducing a short account of the causes of disease, such as "predisposing" and "exciting." He then dwells with more or less detail on what are called the elements of disease, simple and proximate, such as irritability, tonicity, contractibility, sensibility, congestion, determination, inflammation, &c.; and last of all, come the diseases themselves, which occupy the greater part of his course. The maladies are perhaps described first in groups, then in individuals; their definitions given; their courses, symptoms, signs, pointed out; their diagnosis made out, and prognosis inferred; and lastly, the treatment pronounced, according to the various circumstances attending each particular case. The student is afterwards conducted to the hospital, where he has an opportunity of observing, and acquainting himself with disease in reality. He also attends the dead house, to see the morbid changes found on dissection. This is about the sort of training the student receives in almost all our institutions, and after an attendance of a few years of this kind he is warranted a sound practitioner.

We have no objection to the plan of teaching here briefly sketched; perhaps it is the simplest and most convenient considering the extent of our science. But we doubt whether all the objects at which it is desirable to aim, and which it is the duty of the teacher to secure to the student, in order to constitute a good practitioner, are gained. In short, is the



preparatory study complete? We are not disposed to answer in the affirmative; on the contrary, we believe that the most important part of the information with which it is essential that the young practitioner be provided, is either neglected, imperfectly furnished, or entirely overlooked. We mean that sufficient clinical acquaintance—that possibly thorough knowledge of the sick on the part of the student which should be the basis of his new practical existence.

We do not maintain that clinical medicine is not at all inculcated, but that it is not thought of, or taught, to the extent that its vital importance demands.

It now consists in simply making the student acquainted with the principal forms of disease, and their common and prominent complications. It is to be understood, however, that the greater part of our mortality does not take place from any individual affection, simple or complicated, but depends on sources deeper than the disease which gives rise to it. We are frequently in the habit of hearing of ulcers, indigestion, diarrhoea, phthisis, causing death. Surely the whole body does not die on account of a paltry ulcer, nor of indigestion, &c.; neither the ulcer nor the irritant condition of the stomach extends over the whole frame. The real, although the insidious cause of death in all these cases, is to be found in the peculiar state of the body, the diseases, respectively or conjointly with others, inducing a state of the system unfavourable to a prolonged maintenance of life. This state, or *the patient's condition*, is an effect of disease, and proves fatal from its more extended influence. It is not a part of disease, for the latter may be cured without the patient's condition being removed, and men often die simply of this state. Thus, in convalescence from acute long-continued disorders, life is in as much danger as when the disorders coexisted. A practitioner, therefore, has but half done his duty if his chief care has been to cure individual affections only. Life being, as it

were, the combined result of a harmonious play of structure and function in beautiful adaptation and balance, it follows, that the least irregularity in this noble apparatus would engender suffering and endanger its well-being.

All diseases may be said to have a twofold action on the living frame, viz., a forward and a backward at the same time. The forward is more or less circumscribed, and most prominent, and is, in fact, the disease, including symptoms; and the backward, which is equally manifest, but pervades the whole system, is what constitutes the *state* of the patient. Clinical medicine, to be perfect, must treat both these actions in detail.

Few students, as they are now brought up, come out of college with sufficient information on the backward morbid action of disease, synonymous with the *condition of the sick*; they know scarcely half the contents of the sick room; they can discover and cure disease by the instinct of routine; but do they understand the wholesale change of the frame, that gradual descent from the stage of health, till all motion subsides into extinction; which requires our most anxious care to correct, and forms in itself an independent branch of enquiry, at present, as it were, so industriously kept in the background?

We can only admit of three kinds of deaths with reference to their causes, viz., physical, pathological, and physico-pathological. The physical deaths proceed from a sudden or gradual suspension and obliteration of function, as death by lightning, pressure of tumours, &c.; pathological, from alteration, perversion, and dissolution of structure and function, as death by anæmia, phthisis, gangrene, &c.; and lastly, physico-pathological, which occurs in consequence of physical and vital agents operating in mortal concert. The last variety composes nearly nine-tenths of our ordinary mortality. Now, in the generality of cases, it would be perceived that death

begins in the whole body, and not in any individual part or organ: that is, it takes its start from the inmost cells and fibres, that is, again, from the *general condition of the sick*. The consideration of these conditions, generally antecedent to the cessation of life, ought to be the chief object of true pathology; it should certainly be its greatest merit, and pre-eminently its highest development. Pathology, as taught at present, is of individual diseases. It leaves its richest fields—the *condition of the whole body* under suffering, and threatened with ruin—to be indifferently cultivated at some distant, uncertain time. It looks idly, as it were, at the face of the enemy, whose dagger has already been thrust into the heart of the victim. We speak of the primary and proximate elements of disease, and their compounds, the diseases themselves; this has a tendency to localise our ideas and confine our attention to a few facts; our observations are, in consequence, necessarily limited. If at all an enquiry is made beyond the seat of a particular distemper (perhaps the most important part of our duty), it is indicated by some vague phrases, conveying equally crude ideas; such as foulness of the secretions, heat of skin, looseness of the bowels, depression of the spirits, &c.

A further most serious drawback arising from the present system of pathological enquiry occurs in the fact that by mistaking the *state* of the sick for a *symptom*, it encourages a neglect of the most leading features of the case, from which, perhaps, the greatest danger is to be apprehended, and which it should, therefore, be our first object to combat. Thus, in phthisis, the most prominent event is undoubtedly the wasting of the body, a change more universal and alarming than the tubercular deposition which may have given rise to it. Still, viewed as a symptom, no more attention is—medically speaking—paid to this most important condition than would be accorded to it by an ignorant quack under similar circum-

stanees. Why do we not dwell so largely and minutely on this consumption of the flesh as on the tubercles which generally produce it? Have we any treatise giving details of this wasting, its reason, advent, progress, and its distinguishing and general character? Is all wasting of the body the same in every disease? Does every part of the body equally suffer, and what are their stages? What functions most sympathise, and to what extent? and how much from the original disease, and how much from the subsequent process? What are its direct and indirect, vascular, nervous, and glandular complications? If there are any treatises they do not appear to be solely devoted to the subject under consideration, and are at any rate unequal to the extent of our wants. To add another instance, what have we in fever? In general terms it may be said to be a combination of heat and dryness of skin, thirst, parched and perverted secretions, defective and irregular nervous distribution, and adulteration of blood. Now, it is needless to observe that the last two circumstances are the most predominant, most frequent, and the most necessary elements of fever; and that the other attendant phenomena are mere accidents, which may appear or disappear, and be variously developed and associated, without any order or definition. In all mortal attacks of this disease, irregular and defective distribution of nervous influence and adulteration of blood are unquestionably the sole agents of destruction; nevertheless, they form, comparatively speaking, perhaps the least part and the most uncared-for portion of the physician's enquiry. And this simply because, as we have remarked before, the *condition* of the patient in fever is looked upon, treated as, and confounded with *symptoms*. We do not deny that as regards fever, at least, something has been done of late to unfold the practical importance of the general state of the sufferer. But still we unhesitatingly declare our earnest conviction that so long as disease, *i.e.*, its symptoms, are con-

founded with the *sick condition*—distinct and separate as these undoubtedly are in nature—no solid progress would ever result from even the most profound labours in our devoted science. We could multiply examples, but what we have already advanced will suffice for our present purpose. Thus far, then, we are convinced that the so-called young practitioner who is supposed to have completed his clinical education, is not usually stocked with the necessary knowledge at the time of his entrance into independent practice. An immense gap still exists in the temple of his professional growth, which, owing to our present deficient training, can only be filled up at the expense of unwary and benighted humanity.

It might be argued that although an acquaintance with the condition of the sick would be a very desirable acquisition to our younger brethren, yet from the endless phases and complexities it naturally presents, it must, as a matter of course, require years of personal experience and practice to be able fully to undertake it ; that is to say, this most important knowledge, from its very practical bearing, must be acquired by experience. This argument can only hold good with those who have sound eyes, and will not see. Experience is a mere instrument of correction of our former errors and false judgment, our prejudices and shyness, our vacillation and want of depth. It also serves as a means of further knowledge and discovery of hitherto unknown facts. But to say it fails to record its own stores for the benefit of those who have not yet joined its standard, is tantamount to our maintaining that we have a healthy organ of speech, and intelligible sounds and words, but are incapable of framing a clear and communicable language. This is denying human skill and intelligence, and thereby, the natural progressiveness of our race. Let the doctrine that the state of the sick can be learnt by experience alone be at once discarded. Let such



expressions as "a peculiar state of the countenance," "peculiar condition of the fluids," "sui generis," &c., no more disgrace the language of our noble profession, if such be possible. Why do we not describe things at once; at least begin, and try to do so? A distinct expression, however imperfect, is certainly something better than throwing out mysterious hints. It is because we have never tried to shape our experience into letters, that this most essential branch of the therapeutical science has not received its due culture. We have at present few fixed ideas regarding the general laws that govern and direct the various sympathetic and connecting phenomena daily occurring in the living body suffering from disease. We must confess our deep ignorance of the changes of nutrition and circulation, in the thousands of ailments to which our flesh is heir. These changes must differ in different cases, and the knowledge of these cannot but materially add to the efficiency of our treatment. These remarks will equally apply to other functions when deranged. Let us, therefore, for the sake of humanity and for ourselves, if not for the dignity and nobleness of the profession, take timely heed, and do our duty to the age to which we belong. Let us no more remain in darkness in the labyrinth of human ailments, without a sure torch light; the materials of which we possess in the collective experience of the living generation. Let the remains of mystic ages no longer hinder us from the work of laudable renovation. Let us all join with helping hands, and institute a living prophylaxis against the treacherous encroachments of intruding death. Let us direct ourselves to the real seat of danger, where this, our common enemy, is silently at work, and drive him out of our once thriving province of health and peace.

It is with a view to draw the attention of the profession generally to the vital importance of cultivating largely this necessary, although the most neglected branch of medicine,



and in hopes that the subject will soon be taken up by the ablest and most experienced of the faculty, that I have presumed in the following pages, as a sort of humble pioneer, to work out the roads to this useful research.

## CHAPTER I.

TRUE DIRECTION, NATURE, AND OBJECT OF THE  
PRESENT ENQUIRY.

ALL our acquired knowledge is and can be but of three kinds, viz., that of *effects*, of *causes*, and of *states*; and the process of acquisition of knowledge is, without any exception, from below upwards, that is, from the effect to the state, and from the state to the cause; in other words, it is through the principle of causation that we invariably arrive at the conception, or perception, as the case may be, of the operating agent. We shall illustrate this point by an example. Suppose a person standing, was suddenly struck on the head by a ball, wounding the continuity of the skin, and then the ball bounded off and fell on the ground. Here we have a compound result or *effect*, viz., the pain, the bleeding, the forcible striking of the offending body, the subsidence of its motion, and, afterwards, falling of the same on the ground. All these *effects*, which at first strike the senses, may be shown to have each their corresponding, predisposing *states*: and it is only when we have carefully analysed these that we know any of their respective *agents*. For instance, the pain supposes a *state* of sensibility, which sensibility points out the nerves as the probable instrument or cause of sensation. In the same manner the bleeding leads us to vascularity, and vascularity to blood-vessels and blood in motion; the striking of the body to forcible propulsion, and forcible propulsion to the individual who threw the ball; the stoppage of motion to collision, and collision to the head and ball meeting in opposition; and lastly, the fall of the body to gravitation, and gravitation to the earth. We can know, in short, no *cause* from its *effects* without the intervention of some *state*; for in the case of a stone being thrown before us, what is it we first seek to know? certainly it is not

the subject which propelled the stone, but the path or direction of the motion of the stone, or *its state* directly before it fell. If we looked to a different direction from that which the stone had taken, through misinformation of the senses, could we ever find out the object of our search, the agent? Undoubtedly not. Here, in fact, we have an instance of the principle of causation in its full play, which, in its true interpretation, is no other than the *state* just alluded to. Need we again repeat, that it is through the recognition of this principle of causation, or the *state*, as we have called it, which is universal, and necessary to all existences, that we derive the knowledge of real causes. Everything exists with a certain *state* or *states*, or its principle of causation; and when it is in play, that is, when it comes in contact materially or spiritually with something else, likewise endowed with a *state*, as a matter of necessity an *effect* takes place, and the true character and measure of the being is thereby revealed. In order that no misconception may exist as to the absolute necessity of this medium or *state* between cause and effect, we should further observe that what we have denominated "state," as a convenient and comprehensive general term, is usually otherwise described, though in our opinion somewhat vaguely, and in a contracted sense, either as property, quality, attributes of matter, &c., or as a relation subsisting between one thing and another. A *state* or *states*, therefore, call it property, attributes, relations, &c., must be the only condition for a thing to be, or the existence or being of a thing; it is the only possession of an existence, God, man, and the universe; it is the great symbol of life, and, lastly, it is alone, so to speak, the chief clothing, the ornament, the dress, the beauty, the expression, and the tangibility or cognizability of all beings. Destroy the *state*, which is impossible, and you will annihilate the whole creation. It is indestructible, as well as eternal, and the only connecting link between God and man. The necessary interposition of a *state* in the process of all external knowledge being thus admitted, and established beyond cavil, it now remains to see whether the medical

philosopher takes advantage of this intervening principle between cause and effect; which is the only means of our ever possibly discovering the former in the investigation, description, and treatment of disease.

So far as our experience extends, he appears to be chiefly occupied with naming disease and enumerating its symptoms, that is, in signalizing cause and effect; for disease and symptoms can be viewed in no other light than as a factor and its action. Where are we then to look for the *state* between the symptoms and disease, which must exist somewhere, for analogy seldom deceives us, especially as the process of medical knowledge cannot be far different from that of any other. Shall we find it in semeiology, etiology, diagnosis, prognosis, or treatment? does the student usually proceed from symptoms to the state of the body, and then to the disease? It would be obvious to those best able to judge on the subject, that his course is altogether different. The first thing he does is to learn the name of the disease; symptoms follow; and then diagnosis, prognosis, &c. To him the *condition of the sick* is altogether a secondary event, scarcely worthy of consideration, and if ever made a subject of inquiry, he is usually referred to either a mass of undigested, absurd, and contradictory opinions of authors, or to such vague expressions as depression of spirits, restlessness, weakness, debility, cachexy, &c. He clearly sees the symptoms, and partially the disease, and makes his passage from one to the other perhaps surely enough. But it appears as if he were blindfolded during this voyage through the *state* of the body, lest some terrific scene should affect his too tender eyes, and frighten his innocent mind. His theories, like those of his teachers, being chiefly founded on symptoms, the least important part of a pathological whole, and often on some idols of imagination, are like so many gunpowder plots, which terminate sooner or later in an equal number of explosions, each blowing off thousands of our race, who unfortunately happen to be under their mortal influence. It is a proverbial saying, "doctors differ," yet perhaps there is no science which is so exact, and composed

of such fixed laws, as medicine. Medicine is the end of all philosophy, and the converging point of all truths, which gather round it as a focus to illuminate the field of health and disease, but to which, unhappily, we dare not open our eyes, lest they prove too dazzling.

We are ready to confess that the *condition of the sick* has not been altogether overlooked, for such words as "anæmia, plethora, emaciation, debility, infection, plague, &c.," show that attention has been drawn to it. But what we contend for is, that it has not been described so fully and methodically as its immense importance would seem to require, and being, as we have said before, confounded with symptoms, it has lost that value and interest in the eyes of the profession which it should be our first duty to impress upon the mind of the student. It has, in a great measure, been left to be deduced from experience, when it could be easily and conveniently imparted in the lecture-room and clinical wards.

The purpose of our present inquiry is not to delineate disease and point out symptoms, but to unfold and develop, as far as lies in our power, the *intermediate condition of the sick*, or the principle of morbid causation, by which our health is chiefly undermined, and death works its way.

We shall therefore discuss those various changes and deviations of structure and function which occur during the progress of any disease, local or general, as applied to remote parts, or to the whole body.

The *condition of the sick* is naturally so complex, and so infinitely diversified, that an attempt to study or contemplate it without some established plan or method would not only be vain and profitless, but render the subject almost unintelligible to the student. With a view to avoid confusion we cannot do better than first of all analyse the condition of the sick, into its ultimate and proximate elements, and when we have sufficiently done this, consider the particular morbid states as groups of those elementary principles. Hence the division into the general and especial *conditions of the sick*, or principles of pathological causation, appears to us to be indispensable.

## CHAPTER II.

DIVISION OF ANIMAL FUNCTIONS INTO THOSE  
OF COGNIZANCE AND RECOGNIZANCE.

EVERY component part or organ of the human body, or an animal, may be said to be endowed with a certain sense, peculiar to itself, by which it knows and performs its action or function. Thus, the muscular fibre takes cognizance of its stimuli, and contracts ; in other words, the muscle is irritable, that is to say, it has a sense of its own, by the exercise of which contraction takes place ; remove this sense from the muscle, and it will no longer contract. The skin is endowed with the sense of touch ; the stomach with that of chymification ; the liver of secreting bile ; the cells of nutrition, regeneration, &c. These senses are born with the parts in which they reside, and in highly organized animals are connected together, or made mutually subservient, by means of nerves, to fulfil specific ends, as the individuals in a republic. These connecting nerves are what are called the sensiferous filaments, which convey impressions from the periphery to the nervous centres, for the information and welfare of the whole body. Their peripheral extremities, on which impressions are made, may be said to take, as it were, the cognizance of events, of which their central terminations (the brain, spinal marrow, and ganglia) take the recognizance, occasioning a sensation, cerebral, spinal, or ganglionic. The sensiferous branches may therefore generally be called *impression-bearing*, or *cognizant* nerves, and the brain, spinal marrow, and ganglia *recognizant* or *sensation-producing* centres. The motor and other nerves, in that case, are simply conductors of motor power, and sense or sensation generated in the recognizant masses, like the wires of a galvanic battery.

Functions, which are the chief objects of the senses, must



consequently be of necessity *cognizant* or *recognizant*, in virtue of their connection with the nervous system. For instance, when a strong stimulus, as electricity, is applied to a muscle, an instantaneous contraction follows, in which neither the muscular nerve, the brain, the spinal marrow, nor ganglia can be said to take any part. Whether the nerves be present or not, nothing can prevent the muscle from acting under similar circumstances, provided it possesses some vitality. Contraction here takes place long before the impression of the stimuli could be carried to the nervous centres, and a motor influence transmitted to the muscle. It is then possible for a spasm to result from direct impression on the muscular tissue, that is, to be a *cognizant* spasm; which would be *recognizant* if excited by motor nerves. A *cognizant* action, or *cognizance*, is the result of an independent exercise of the inherent power or sense with which each organ or part is naturally provided. On the other hand, a *recognizant* action, or *recognizance*, is always a dependent phenomenon; an act of the nervous system in which other parts or organs, and sometimes the whole body, is concerned; the one being, as it were, the voluntary action of an individual, the other, the fulfilment of the economical dictates of a society.

What we have said with regard to the function of the muscle will hold good with regard to other functions. Thus, the functions of sight and hearing are *cognizant* so long as we do not attend to the impressions of visible or audible objects; and *recognizant*, the moment we attend to them. All the chemical and physical phenomena of the body, as the alterations of the blood by commixture with foreign matters and poisons, and its exposure to oxygen, exosmosis, endosmosis, wounds, burns, destruction of parts by alkalies, &c., are *cognizant*; and those produced by vital causes, through the agency of the nervous system, such as the contraction of the heart and arteries, the ordinary motions of the chest, abdomen, and intestinal canal, inflammation, congestion, determination, fever, convulsions, &c., are *recognizant*. It is not improbable that many poisons, as hydrocyanic acid, a large quantity of

alcohol suddenly imbibed, snake poison, &c., sometimes destroy life by excessive *cognizance*, or too much impression. We know there is very little *recognizance* in these cases, that is, reaction, or sensation. May not plague, cholera, typhus fever, sometimes operate in the same way, viz., by excessive *cognizance*, with defective *recognizance*? How does a violent blow at the pit of the stomach, and lightning, kill? What is a shock? Is it not a pure *cognizance* of the nerves? We can cite numerous other instances to show that every function, muscular, vascular, alimentary, and nervous, which are usually *recognizant*, are liable to be now and then *cognizant*. *Cognizant* function, in short, in its true interpretation, in a pathological sense, is a disease to which the *recognizant* is a natural resistance. For an example, when a foreign body is impacted in the gullet, or intestines, and distends, and presses upon the walls of those tubes (that is, it causes a *cognizant* impression), nature is soon made aware of the fact, and calling in aid the power of the neighbouring voluntary and involuntary muscles (that is, *recognizant*-muscular function), expels the offending body.

At present the whole contention is erroneously called disease; confounding friends with the enemy. Every disease is a *cognizance* struggling with nature, that is, *recognizance*. To take another example. In hepatitis, the distension of the organ—from some obstruction to its circulation—effusion, and extravasation of serum, pus, and lymph, are *cognizant* phenomena; and pain, fever, vomiting, loss of appetite, &c., are *recognizant*. Had not the latter shown themselves, the disease could never have been known or cured.

The modern physician is too much occupied with *cognizant* functions; indeed, his knowledge of *recognizance* is extremely limited, and does not extend beyond such expressions as fever, inflammation, tonicity, tonic and clonic spasm, &c., themselves very vague and questionable terms, as we shall hereafter show.

Rational medicine should comprise an acquaintance not only with the *cognizant* disease, but also with the *recognizant*

state of the body, both in the seat of cognizance, and elsewhere in the whole body, as acknowledged by the system.

We should here observe that *recognizance*, although it is originally a healthy process, yet often becomes afterwards a source of suffering from misdirection, excess, or unequal distribution. If we regard the *state of the sick* as being general and local, it would be found by the intelligent student that *recognizance* is synonymous with the former of those conditions, being extended from the seat of disease, or *morbid cognizance*, to the remotest living cell and fibre.

## CHAPTER III.

## MUSCULAR SENSE, OR STATE OF MUSCLES UNDER DISEASE.

THE most prominent vital property of a muscle is, undoubtedly, its irritability, or contractility, or its power to contract on the application of a stimulus. The stimuli are either internal, as volition and spinal influence ; or external, as cold, electricity, &c. The former are conveyed to the muscles direct through the medium of motor nerves ; but the latter excite contraction, either by direct impression on the muscular tissue, or by, the impression being first conducted to nervous centres, and afterwards reflected upon the muscle.

Muscles, by virtue of nerves distributed over them, are also possessed of sensibility, by which we know when they are injured, and we are also generally apprised of their present condition. The ordinary contractions, although we are aware of them, we do not feel ; but the extraordinary ones we do ; as the tonic spasms of tetanus, hydrophobia, and cholera, the peristaltic contractions of the intestines in their various diseases, wry neck, &c. A certain latitude is allowed to each structure for the performance of its healthy function, beyond which, if it be pressed or extended, it becomes the seat of painful sensations. Some pressure or extension ; that is, some unnatural alteration of physical form, seems to be essential to the production of pain.

The muscular sense is the cause of all muscular phenomena, in peace or perturbation ; it is resident in the muscular substance ; and although excitable by nerves and external stimuli, it does not originate in them.

We shall now see how the resident sense of muscles is *recognized* by the system in disease ; but before doing so, it may not be uninteresting to offer a few general observations on motion and the organs of motion.

## CHAPTER IV.

## MOTION, AND ORGANS OF MOTION, OF ANIMALS.

A MOTION of some kind seems to be essential to organization; we mean some motion of its own, or particular individual motion, for we know of no matter, animate or inanimate, which can be said to be truly and absolutely fixed. The loftiest mountains, the great and magnificent cities, the silent and solemn pyramids of departed grandeur, and the calmest ocean, are each and all eternally moving through the infinity of time and space. Every existence or entity (we are now speaking of our own globe), has a certain age in which it is ever performing some rotation round the axis of the earth, as well as the fiery orb of the sun. Age, in fact, is almost synonymous with motion, and is the chronicle of every phenomenon occurring in nature.

The principal events of the earth are its motions, which are either general or independent particular motions. Organization is one of these events.

The most conspicuous endowment of an animal is certainly its motion, performed by an apparatus, which apparently varies in different animals, and in the same animal in different situations, and the different stages of its development. This apparatus, as far as modern discoveries inform us, is constituted of a homogeneous substance, and may be said to assume three original forms, each adapted to its own peculiar motion. These three forms, with their corresponding motions, are as follows:—1st, cilia and ciliary motion; 2nd, tubes or cells, with an orifice, and tubular motion; 3rd, cells without an orifice, and cellular motion.

Firstly.\* The ciliary, or vibratile motion, may be said to

\* See our observations as to the probable structure of the primitive animal basis or substance in the chapter on secretions, where we have sup-

take place from a jarring or shaking of the cilia, in consequence of elemental impression on their inherent contractile sense, with a concentration or predominance of the vibration on one side or another, so as to give the motion a lashing and a fanning, or wave-like aspect. The current they produce, when several act in concert, has a special direction subservient to some purpose to the animal, and offers this distinction, that it is always external to them, viz., to the cilia.

Secondly. Tubes and cells with an orifice, yet without muscular fibres, as the embryonic heart, minute cellular infusorial animalcules, &c. These contract with the exercise of the same faculty; but the current they cause is within them, and invariably rushes through their outlets.

Thirdly. In such cells, however, as have no opening or orifice, buccal, or anal, as the free red corpuscles of the blood (*which, we have reason to suppose, contract as other cells in the body*), the motion that would necessarily follow must be of a different kind.

A cell may be viewed as a globular homogeneous vesicle, consisting of two halves or hemispheres, like the globe; and surrounded by an imaginary line or belt, which may be called the cell-equator. Such a cell, to contract evenly, from every part of its surface at the same time, can so contract only by bursting out its granulous or amorphous contents by rupture of its soft parietes, for it is impossible to allow that a large cell can grow smaller by contraction and condensation of its internal contents. The extreme thinness and delicacy of the cell-wall, and its almost imperceptible motion, could not generate a pressure, however great, that would be required to crush and condense any material with which it may be stuffed. This is supposing that all cells are more or less vesicular; but even supposing that they consisted of definite solid amœboid particles or particles of protoplasm, the same law still holds good, viz., that they could not uniformly composed it to be porous like sponge, in conformity with the general notion of porosity of all material atoms.



tract from all round without bursting or rupture of their substance.

The only way in which a cellular contraction may take place, or a globular body such as a cell could contract, would be by a partial one, viz., that while one part of the surface contracts, another yields; so that the shrinking of one part is accommodated by the bulging of another: in other words, the motion of cells is only possible at their two ends, constituting cell poles. That the red corpuscles in animals are in a state of constant contraction at some parts and of relaxation at others, is proved by the very shape and appearance of those cells.

The usual shape of these corpuscles is either oval, or like flat discs, with a dimple or depression on the centre of each side; in one case, the cell is round throughout, with a bulging at the equator, and terminating in a pole at each end; in the other, it is flat and bi-concave, with bulging at the circumference; the poles here are, as it were, pushed in towards its centre by an addition to the strength of contraction.

We now venture to ask, what causes this diversity in the figure of the red corpuscles of the blood; the polarity and equatorial distension of some; the flattened depression in the centre, and circumferential dilatation of others? Were they originally so formed and shaped? Those who have carefully studied the subject of the development of cells, are well aware that cells, when first formed, are uniform in their outline, perhaps they are globular, having equal radii. Their elliptical or disc-like form appears, therefore, to be afterwards determined, and dependent upon some ulterior cause, which must be the result of some force, internal or external, acting incessantly on the cell-parietes. It cannot be the impulse of the moving blood, nor the pressure of the contents of the cell. If the *liquor sanguinis*, or the fluid contents of cells had any such effect, it would have been uniform all over the surface of the cell, exterior or interior; and the resulting figure would be perfectly round like a ball, with equal

radii. The cause of the characteristic figure of red corpuscles, then, must be resident somewhere in the cell membrane, in the homogeneity of the walls of the cell. What can this resident agent be? We answer, it is the vital sense of the substance of the cell-membrane, the same vivifying power which produces ciliary motion in cilia. The cilia, the tubular heart of the embryo, and the cell-membrane are all, as far as the eye could see, structureless and homogeneous, and consist of the same ultimate animal atoms or granules. Why should they, then, not be equally endowed with the same vital sense of contractility which undoubtedly exists in the cilia and the simple embryonic heart?

That the cell membrane actually enjoys the identical sense by the use of which it occasions the distension of the middle of the oval cells, and the circumferential dilatation of the flat corpuscles, we cannot entertain the slightest doubt. It is an undisputed fact that cells are vital formations; they have all a certain vitality: this vitality is, in our opinion, the same which we recognize in the vibratile cilia and the pulsating heart tube. It may be called primary motor sense; and in the closed-up cells acts by concentration on their two opposite points or poles; inducing, so to speak, a boreal and an austral contraction; the conjoined cause of their oval or flat appearance. In the human body it is most intense, and thence results the dimple or concavity. The pulsating tubular heart and cilia are never tired, neither are the red corpuscles whose contractility is ceaseless unto death.

The rouleaux in the coagulated blood are the result of an exaggerated contraction or the last act of contraction, of these blood particles, as *rigor mortis* is the last act of contraction of ordinary muscles which are primarily of the same sareous element.

String or connect these cells, *if solid, the better, and at one stage they must be all solid*, with a slight pressure in rows, that is, the boreal pole of the one with the austral of another, and so on, to a limited length, and we shall have a clear conception of the fibrillæ of a voluntary muscle. A



number of such fibrillæ will constitute a muscular fibre. A muscle is, therefore, essentially a composition either of cells as a voluntary muscle, or lengthened cilia, as an involuntary muscle, or of cells and cilia both, as a mixed muscle.

We know no fact connected with the structure or function of muscles that cannot be explained by the simple view we have here taken of their composition. The so-called irritability, contractility, or muscular sense, are synonymous with the pulsating capability of the heart; the pulsating capability with the vibratile power, and the vibratile power with the polar activity of the cells. We have, also, shown the identity of these several organs of motion as regards the homogeneity of their composition. They all consist, absolutely, of the same albuminous, structureless, vibratile substance, the "germinal matter" of Beale, and "sarcode," "plastema," and "protoplasm" of other authors.

The motor faculty, and organization of moving organs, being the same throughout the animal kingdom, it follows that motion, wherever it occurs, must be fundamentally the same also. It is variously modified, however, according to the kind of arrangement the ultimate motor atoms undergo, such as, for instance, whether they become solid bodies, as cilia; or hollow tubes, as capillaries; or solid or vesicular cells, as red corpuscles and some epithelial cells.

For practical purposes we shall, as we said before, recognize three primitive motions, viz., the ciliary, the tubular, and the cellular. In ciliary motion, objects are drawn inwards or outwards in relation to the animal; in tubular, they are propelled forwards; and lastly, in the cellular, they are jammed together in their own cell-substance, as it were, by a motion of opposition from each pole. These become severally compounded into the tentacular, vascular, and muscular motions, according as the organ of motion is a compound of cilia, tubes, or cells.

There are some tentacles which may thus be considered as branched cilia; and also the vascular system in most invertebrata, as branched tubular heart. In higher animals,

cells and modifications of cells and cilia are added to these, as in the powerful muscular tentacles of the cephalopods and the vascular system of vertebrata.

As there are three primitive types, and their compounds of moving organs and motion, so there are three different kinds of primitive animals, viz., the ciliary, tubular, and cellular. The spermatozoon may be regarded as a ciliary animal, the sponge as a tubular, and the impregnated ovum as a cellular. The higher organized animals may be considered as various combinations of these. Thus, in man, we have the cilia, the pale muscular fibres, and spermatozoon, as representatives of the ciliary animal; the vascular system, as that of the tubular; and lastly, the epithelium and voluntary muscles, as those of the cellular. The nervous system is a further addition of cells and tubes for more refined motions or sensations.

Some physiologists still contend that a tissue to be contractile must have some muscular fibres in it, and suppose that even the cilia may have a muscular apparatus which the microscope will on some future day reveal to us.\*

This is, to say the least, a most absurd doctrine; and is equal to our maintaining that the simple homogeneous cell-membrane, which contracts, consists, as a matter of course, of a congeries of other cells, in the manner of a voluntary muscle, and the membranes of these other cells of cells still finer; for the cilia and cells are not different tissues, but the same tissue varying only in shape and name, and as such should be constituted alike.

The microscope may disclose to us some secrets with regard to the arrangement of the ultimate granules or atoms of these elementary tissues; but to say that we shall yet discover a muscular apparatus in cilia and the cell walls, is a supposition extremely far fetched and bordering on positive delusion. And, even if there were such a structure, and such structure were carried on *ad infinitum*, it could not materially alter the substance of our theory on the anatomy of the mus-

\* N.B. It is said that Ehrenburgh has discovered muscular fibres in cilia.

cular tissue in general, nor enlighten us a whit more on the subject of muscular action.

As the animal rises in the scale of importance, and its wants are multiplied, we see new parts are being added to its primitive instruments of motion, with a view to increase its field of operation, to fulfil the ends of its new complex condition. These auxiliaries it is not our present object to discuss. They consist, in man, of bones, ligaments, cartilages, synovial membranes, &c., which contribute to form joints.

The joints are variously made and disposed, but all correspond in this respect, that the motions generated by their co-operation are, without exception, more or less curvilinear, or in curves. Thus, although it is apparently true that we can draw a straight line, yet the motion, if carefully surveyed from its commencement to its cessation, will, in reality, be found to be performed in a curve. The longer the tangent, and straighter the line, the greater is the arc which they partially represent. Whether this proceeds from the nature of our joints or the law of universal rotundity of motion, the fact that we can never produce a single rectilinear movement is unquestionable.

## CHAPTER V.

## MORBID STATE OF VOLUNTARY MUSCLES.

THE muscular sense of voluntary muscles under disease may exist in three states, viz., it may be increased or exaggerated, decreased or lowered, and perverted or degenerated. Sometimes only a single group, more commonly many groups of muscles are affected at the same time in tardy or quick succession.

Excessive action of single groups is exemplified in bearing-down contractions during labour, in lock jaw, in the beating of the hands in hysteria, and in the various rotatory, hammering, and the many limited movements of the insane, &c. The same occurring in larger and in several groups may be instanced in convulsions from dentition and other causes, in the fits of hysteria, epilepsy, catalepsy, chorea, hydrophobia, and tetanus, and in the shaking and rigidity of cold, or rigor, &c. The muscular sense becomes defective in the course of paralysis, and perverted in delirium-tremens.

The condition of the muscular system in these various cases is by no means the same; and yet, beyond a partial reference to its duration and force, we know no more of this important state than as if we were mere bystanders. We are entirely ignorant of the state of circulation in the seat of spasm or in distant parts. We do not know in what way or proportion the nerves suffer; whether their sufferings act as cause or effect. To what extent are nutrition and secretion implicated. Why do the convulsions come and go off, or cease independently of the will? for we know volition is present in hysteria, as seen in some of the rhythmic movements which cannot be entirely accounted for on the score of former habits, and yet the will has not the slightest control on the con-

tinuance of the fit. If the condition of muscles be identical and similar in the cases above named, why, it may be asked, are the various animal organs and functions differently affected in each? Why is consciousness destroyed in epilepsy, and reserved in hysteria? What is it which tends to make hysteria, epilepsy, and catalepsy direct their force more particularly to voluntary muscles? and hydrophobia, and tetanus to those of the abdomen and chest—that is, the mixed muscles—also?

Increased muscular action is compatible with either fullness or emptiness of vessels, as in hydrophobia, and convulsions from loss of blood; with existence or non-existence of the will, as in tetanus, and epilepsy; and, lastly, with the higher and lower condition of the body, as we observe in hydrophobia, and convulsive fits preceding some deaths from lingering diseases. Again, spasms alternate or follow each other in quick or distant succession, as in hysteria and epilepsy; or become continued for longer or shorter intervals, as in catalepsy, opisthotonos, &c., or they may be irregular, as in tumultuous shakings from cold and other causes.

Much light would, no doubt, be thrown on the pathology of muscles by directing our inquiry into these several points; but, at present, the subject is full of mystery and confusion. We do not pretend to have it in our power to explain all the diverse conditions of muscles, and the relations of their action in detail when deranged; most of them must be necessarily left to be unfolded by future observers. Nevertheless, there are a few well-established facts from which an attempt may be made at interpretation of some of their most prominent phenomena, especially when their function is exalted.

It is a circumstance well known that every muscle has a sheath, or something round it which serves as such; that is, it has a certain space or extension within which it usually acts. The skin may, in this respect, be considered as a kind of sheath to the muscles of the whole body, which are thus constantly kept in a state of tight elastic compression. May not this fact, viz., that the skin acts as a general compressor,



enable us to explain some hitherto inexplicable muscular conditions? May not rigor of fever and shaking of the body from cold be partly attributed to the increased tightening of the skin? When the surface is exposed to cold, or there is a sensation of chilliness and cold, the skin shrinks, and thereby encroaches more on the playground of the muscles; and the consequence of this must be that the contractions of the latter which immediately follow as another result of the application of cold are generally imperfect, the tightness of the skin not allowing the knots to be fully formed. We have, therefore, instead of complete determinate contractions, imperfect, irregular and indeterminate spasms, characterising the shivering fit of ague or cold. On the other hand, when there is no retrenchment of the natural elasticity or extensibility of the skin, and the contractions are not interfered with, the spasm is generally complete, if the stimulation has been sufficient, as we find in the ordinary convulsions and cramps.

What influence the integuments have on the phenomena of the muscles of the whole body, may, for aught we know, be exerted by tendinous sheaths of muscles upon their individual members or their single groups, especially where the muscular theca is strong, and in intimate connection with those in its neighbourhood, as, for instance, in the loins. It is, therefore, not at all impossible for a muscle so to contract as to tighten and draw towards it the sheaths of its neighbours, thereby interfering not only with their ordinary but diseased movements. Perhaps lumbago is a morbid muscular action of this nature, seeing how often the abstraction of blood from, or a blister on, one particular spot in the loins affords relief to the whole of that region. Do we not in dislocations find a similar condition of muscles?

Another point of still greater importance is to be noted while investigating the condition of muscles, viz., their peculiar arrangement, and relative disposition in the body. There is a principle of antagonism carried on throughout the system in this respect. They are so arranged that they must oppose or antagonise each other, directly or indirectly, in small or large

groups, in their action ; the flexors oppose the extensors, the pronators the supinators, &c. Complete motion can take place when only one set of muscles act, the opposite set not interfering at all. But when both such groups act together, and with equal force, motion of any kind, although there be a strong tendency to spasm, is physically impossible ; and the parts where such a state of things obtains must remain rigidly fixed. We shall now see how far this peculiar arrangement of muscles will avail us in our inquiry into muscular affections characterized by excessive movement, or a disposition thereto.

When a muscle or a group of muscles contracts without any opposition from other muscles, the motion or motions that follow are generally complete and regular, that is, they enjoy their natural full course, uninterrupted by any adverse circumstance. Such are some of the rhythmic and measured movements of hysteric and insane patients ; as beating of hands, swinging of the body backwards and forwards, &c. The freedom and entireness of motion are to be here attributed to the evenness and completeness of the muscular contractions or spasms, on which they depend.

These spasms we propose to denominate *complete existent spasms*, as denoting their simple existence and completeness.

A greater proportion of muscular disorders, however, assume more or less a shaking character, that is, the movements attendant upon spasm are opposed and partial, and far from attaining their natural full course ; they are, as it were, neither complete in one way nor another. Before the limbs are fully bent or *adducted*, they are called upon to extend and *abduct*, and *vice versâ*. In a case of this kind, the whole of the voluntary muscles concerned are equally stimulated to act almost simultaneously with each other, so as to encroach upon one another's action, and the consequence is irregular, incomplete spasms and movements. These we would accordingly name *incomplete co-existent spasms*, in consequence of partial co-existence, and partiality of contraction in all the naturally antagonistic muscles. They constitute the convulsions, properly so called ; the cold fit of ague, and also the muscular



phenomena in hysteria, chorea, epilepsy, hydrophobia, and tetanus. In these, therefore, we have to contend with a severer and more extensive form of disease than those characterised by the simpler existent spasm. And it is to the degree and extent of the co-existent contraction that we should look for the real cause of rapid death in hydrophobia and tetanus; and the benign or malignant character of those diseases which usually set in with rigor; the choking of hydrophobia, and the suffocating compression of tetanus, is to be explained by a reference to the combined and *coetaneous* action of the expiratory and inspiratory muscles.

We must not here overlook the important fact that the co-existent spasm being incomplete, it follows that a greater part of the resident muscular sense or capacity for contraction must remain unemployed for a time, that is, the part in excess of what is required for the existing spasm. This can tend to but one result, viz., exhaustion, either by repetition of contraction, or by continuance of the spasm for some time, provided, of course, the impression which calls forth the morbid muscular activity does not cease to act. The former mode, that is, exhaustion by repetition of contraction, occurs, as the student will perceive, in common convulsions, hysteria, chorea, epilepsy, &c., which are distinguished by clonic or transient, or oft recurring spasms, and the latter, or continuance of the spasm, in hydrophobia, *tetanus*, emprosthotonos, *lock-jaw*, &c., which have, on the contrary, durable and tonic spasms. Indeed, the existence of incomplete co-existent spasm is inseparable from repetition on the one hand, and durability of contraction on the other, whatever notion we may entertain respecting the condition or nature of the inherent muscular sense.

In some instances the muscular sense, although very much exalted (excessive contractibility), is so equi-balanced between the opposite sets of muscles, and, at the same time, so evenly excited, that no motion can possibly take place without some artificial assistance. In a case like this, the contractile force acts on the body as if on a centre from the circumference, the

origins of muscles collectively forming the centre, and their insertions the collective circumference. As a necessary result, the body or any member of an animal so circumstanced would not or could not move at all, although ready to do so, in any way to its fullest extent. In plainer language, as the body cannot move in all directions at the same time, it must, as a matter of course, remain perfectly fixed in any position in which it is kept. Such appears to us to be the true condition of the voluntary muscles in catalepsy, and perhaps also in the trance of mesmerism and chloroform. In the exhibition of chloroform there is a sudden impression, which, being quickly reflected, and evenly distributed to all the muscles of volition, cannot but produce a cataleptic effect. It would not be a wonder if alcohol and other such ethereal fluids imbibed in the same way should give rise to a like result.

As there is little or no actual contraction in catalepsy, it follows that there should be a greater amount of spare muscular sense than in cases of partially co-existent spasm, and consequently a longer duration of the cataleptic fit, or rigidity, than in that of emprosthotonos, pleurosthenos, lockjaw, &c. Hence the continuance of a paroxysm of catalepsy for even days together. We cannot form a more perfect idea of the fitness or efficiency of our muscular apparatus than in this disease; and yet its object is frustrated by the same mustering, so to speak, universally in full force.

In the existent spasm, the contraction is free, and momentary with its natural extent of motion. In the partially co-existent, it is incomplete, more or less opposed, and slightly continuous, with less than its natural extent of motion. But in the last variety it is almost imperceptible, greatly continuous, and so interfered with as to render the subject immovable and statue-like. For the sake of uniformity, we shall call this the cataleptic or *complete co-existent spasm*. The muscles in catalepsy are, no doubt, in a state of spasm (contraction), although there is still no visible shortening of their substance nor perceptible motion, hence the application of the phrase "cataleptic spasm, or complete co-

existent spasm," is not so imaginary as it might at first sight appear.

According to the simple view we have taken of the actual condition of the voluntary, as well as some mixed muscles, when their contractility is exalted, we might divide their diseases into three principal families. The first of these is the family of *existent spasms* or cramps, including all the free regulated movements generally associated with some diseases, as cramps of the legs in some cases of fever; in cholera, grimaces and gesticulations of the insane, jumping out of bed, leaping out of windows, suicidal motions, &c.

The second class consists of the *incomplete co-existent spasms*, and will embrace hysteria, chorea, epilepsy, and general convulsions from irritation of the alimentary canal or other causes, and also tetanus and hydrophobia. No medical man will fail to notice the striking family likeness that exists between these diseases, excepting, perhaps, hydrophobia and tetanus, which form a sort of connecting link or transition between the convulsive disorders ordinarily so-called and catalepsy. They are indicated by the same state of the muscular sense or contractility; the contractions characterizing them are of the same kind; they originate, generally speaking, from similar, nay sometimes identical, causes; and, lastly, they do not materially differ in the general plans of their treatment. It is very true, consciousness is present in hysteria, and lost in epilepsy; but, in a practical point of view, we cannot say much weight need be attached to this fact. It would matter little if the little consciousness which the hysteric patients retain were entirely annihilated. Further, it may be argued, they differ in the duration of their attacks; and that while some alternate with health and intermit, others do not present such intervals, and continue for an uncertain length of time. To this, it may be replied, that other diseases have like periodicity, course, and termination, without being necessarily different affections; as, for instance, fever.

The third, and the last family of muscular diseases where excessive action is manifest, is that of *complete co-existent*

spasms, which comprehend catalepsy, trance of mesmerism and of chloroform; and often certain cases or states of coma and asphyxia ready to terminate or break out in general convulsions. In these the body, like a waxen statue, may be turned and kept in any position we please, without the slightest opposition from the patient. They have, also, this peculiarity, that they seldom interfere directly with the functions of respiration and digestion, and other vital processes, their influence being chiefly confined to the voluntary muscles.

There is a species of inordinate contraction in which the spasm creeps on or wanders from part to part; without any definite route or distinction as to this or that muscle; or whether they contribute to the same motion or to an opposite one. They are witnessed in persons who get habitually drunk, in opium-eaters, and other devotees to intemperance, when either with a view to prospective temperance their supply of alcohol, or any other intoxicating agent, is suddenly reduced, or it is entirely cut off by accident. These spasms are generally existent, but gradual and continuous; and occur chiefly in the muscles of the abdomen, back, chest, and neck.

Further, we are disposed to think that the state of voluntary muscles in rheumatism is that of partial contraction, which may be existent or co-existent, but slow and continuous. We infer this from the stiffness and rigidity of limbs induced by the disease, and the momentary relief which ensues from pressure and shampooing. By pressure and heat we reduce the morbid contractility to some extent, and cause the muscle to resume, more or less, its natural condition; hence the temporary relief of pain.

Muscular sense becomes, also, excessive by accumulation, as in fractures in which the limb is bound up; or recent cases of paralysis, where nutrition is still kept up with tolerable vigour. In paralysis, although the contractile sense may be natural or beyond its usual quantum, yet motion entirely fails, owing to want of subserviency of the brain, or

the spinal marrow, or both, which remain, as it were, rather as the spectators of the unhealthy scenes around them, than their directors. The mind is generally present and quite sound, but the volitions are of little avail, being unresponded to by the required movements.

## CHAPTER VI.

DEFECTIVE AND PERVERTED MUSCULAR SENSE.  
(VOLUNTARY MUSCLE.)

DEFECTIVE contractility may, in the generality of cases, be traced to a want of proper nourishment of muscles, sudden or gradual, but it may be considered in three relations according to whether the defective nourishment arises from a faulty condition of the muscles, the nervous system, or of the mind; and hence we shall speak of a *sarcous, nervous, and mental palsy*, meaning by the word palsy, incapability of motion, partial or complete.

The first is exemplified in fatigue and exhaustion from undue exertion, and also in debility and emaciation from disease. We cannot say that the cause of fatigue and exhaustion we experience in the muscles is seated in the nervous centres, for the mind may will, and its volitions may be easily transmitted to the muscles as in vigorous health, and yet the latter will not contract in consequence of the deficiency of their resident sense at the time. For example, when an animal is hunted to death by running till it is completely exhausted, and falls a helpless prey to our hands, it is not that it can no longer will, and send down its volitions to the muscles by the power of which it has hitherto eluded pursuit, but because the inherent contractility of muscles, on which motion is absolutely dependent, being now all nearly expended, the muscular system of the animal must remain for the time utterly useless. The muscles here are alone to blame for the defective capability. For who would not fly from an enemy if he could, if his muscles could bear him. Some may suppose that the nervous system\* is the chief cause of the diminution of muscular power in emaciation, or that it is

\* Our observation here is only in reference to the voluntary portion of the nervous system.



equally implicated with the muscles, and undergoes similar changes. We are far from denying that the nervous system has not something to do with it, and that it does not suffer conjointly with muscles; but we can cite many facts observed during life, as well as after death, to prove that the principal cause of defective muscular sense in debility and emaciation, resides in the muscles, and that it is not necessarily from any implication of nerves. For instance, a person suffering from typhus fever in its last stage, if he retains his senses, knows very well the comforts of an occasional change of posture, and he actually tries to sit up, and move from side to side, but to no purpose, so that, so far as his power of willing or transmitting his desire by the motor nerves is concerned, he still betrays his usual mastery over both, but they are of no service to him on account of the alarming degradation of the muscular sense which takes place independently of the suffering of the nerves. Again, in the dissecting-room, the subject which we examine, whether it be from cholera or typhus fever, does not present any physical alteration in the nervous system from which one might suppose the nerves have undergone similar changes with the muscles. For it does not appear that in cholera the motor nerves are actually bigger and thicker or otherwise different than they are in the corpse of the typhoid patient.

The second kind of defective muscular sense is met with in cases of paralysis of motion, local or general, as palsy of the hands, hemiplegia, paraplegia, &c. In these diseases, it is the nervous system, the channel of volition, and spinal influence, that is, in the first instance, at fault; the muscles being no longer used for purposes to which they are destined, become inactive; their nutrition is rendered tardy, imperfect, and poor; and they waste away, and their resident sense is, as a matter of course, proportionately reduced. So that paralysis, although the original or remote, is not the immediate cause of the failure of the muscular sense, which proceeds, in point of fact, from the inactive condition of muscles induced by that disease.



In the third variety of defective muscular sense, *mental palsy*, it is, as we have before said, the mind which is principally to blame. We observe this in the constrained movements of laziness, melancholia, and despondency; the helpless condition of muscles in sudden fright and surprise; the dried up, uplifted arms of the Indian mendicant, &c. In a great many of these instances, the contractile power becomes actually defective from want of due exercise in consequence of continued idleness, disease, or some whim of the mind. Men suffering habitually from this condition of muscles are to be compared with sloths in human shape.

*Perverted Muscular Sense.*—A function is said to be perverted when it exhibits, whether in excess or defect, no fixed aim or purpose, and is performed in a manner that observes no definite law. Thus, in the instance of a muscle, we say its motion is perverted when the contraction, instead of being simply increased or decreased, so as to cause a forcible or weak spasm, is irregular, unsteady, and quivering or tremulous. There seems to be, as it were, a want of consent or co-operation between one fibre and another, or an irregular distribution of the resident sense, or the muscles are irregularly excited. As examples of perverted contractility, we may cite delirium tremens and chorea. We cannot say that some of the contractions of hysteria and hydrophobia, epilepsy and tetanus, are not perverted also, arising from perverted muscular sense in excess.

## CHAPTER VII.

THE STATE OF CIRCULATION IN MUSCLES  
GENERALLY.

THE condition of the vascular apparatus, both in and out of a muscle, while its contractility is deranged and its motions are either exalted, or lowered, is a subject fraught with immense interest to the pathological enquirer, and one to which his attention should be early directed. But such is the short-sightedness and apathy of the modern practitioner, that he seldom thinks it worth his while to make even a slight allusion to it. We speak of a full-bounding pulse of rheumatism, increased action of the carotids during a fit of convulsions, increased volume of veins issuing from a part which is being exercised or moved, &c., but we seldom trouble ourselves to enquire of what that sudden distension of vessels and the impetuosity of their currents are indicative. We call ourselves competent medical judges, and we examine facts and derive a certain evidence, but we do not apply this evidence to the end for which we sought it, viz., to decide as to the merits of a case under investigation. To us, as it were, no certain knowledge is possible, unless it be tested by the senses; for as a plea against our ignorance of the state of circulation in muscles, we maintain that, as we cannot enter into and see through the substance of muscles when contracted, it is useless to speculate in what condition the vessels may be in them. But the physician ought to know that medicine is not entirely a sensual philosophy, and that reflection and reason are as necessary as the especial senses to its perfect acknowledgment as a science. Consequently, although we do not, or may not, see the vessels in a contracted muscle, yet, in our opinion, their condition may be accurately inferred from reasoning on such closely-associated phenomena as are patent to the senses.

When the body is being exercised, as in walking, running, swimming, &c., we see the veins and arteries fill up, and the latter to beat with more force compared with what they did when at rest. These are, undoubtedly, unquestionable phenomena, and observable in every case, without exception. When a person swims, he exerts almost all his voluntary muscles. Now, the question arises, whence does all the blood which is required to distend the veins and arteries, and (to judge from analogy) to meet the increased demand for nutrition in parts that are moving, come?

Is it possible we form more blood when we swim, run, walk, &c., in order to fulfil these exigencies? If so, our only rational, and the simplest way of proceeding in anæmic subjects, would be to throw them into the nearest river. It would be equally absurd to maintain that the universal vascular repletion takes place at the expense of involuntary muscles and other parts of the body; for we know that during natation or any other similar exercise we can eat, digest, pass stools, and urine, and think and talk as usual, showing that the parts which are not engaged in the act of swimming, &c., are not deficient in blood. If the blood, therefore, comes from any other part at all, it must be from the moving muscles themselves. The following seems to be the only way in which the augmented fulness of the arterial and venous trunks can be accounted for.

The changes which a muscle generally undergoes during contraction are a shortening of its length and a swelling out at its middle, which feels hard and rigid, and is technically called the *knot* of the muscle. Such being the case, we cannot but conclude that the larger and longer branches of muscular arteries (viz., the arteries in the substance of a muscle) are variously bent and contorted, or, it may be, also compressed and flattened during the action of a muscle, so as to adapt themselves to its now shrunken shape; and, moreover, it is not improbable that the capillary network around each fibre of a muscle is also more or less affected in the same way, that is, the lines of capillaries are likewise rendered tortuous and

compressed from close package. Whatever, however, may be the manner in or extent to which the tortuousness or flattening of vessels goes on, we cannot doubt that these states actually overtake them in a contracted muscle, and that they give rise to some obstruction of circulation in the body of the muscle in proportion to the extent of contraction, amounting in some cases, perhaps, to a momentary suspension. The vascular ramifications being no longer in their straight course—their channel being also more or less encroached upon, and the motion of blood thereby retarded—it follows that the arteries entering the muscle contracting or contracted, must so much yield to the injecting force of the heart, and contain an additional quantity of blood, which cannot now pass so easily through the muscle in consequence of the state of vessels we have above shown to exist during contraction. These arteries, therefore, and those immediately preceding or above them, must swell out and dilate at each pulsation, and hence their increased throb and fulness.

It may be here asked, if contraction of muscles necessarily gives rise to oppressed circulation in them, how is it that exercise improves it generally by rendering it more free and vigorous. To this we reply, that in the gentle exercise which proves so beneficial, it is not the case that all the muscles of the body act simultaneously, which would embarrass the general circulation, but that they contract alternately, one associated group after another, as the flexors after the extensors, and *vice versa*; so that, although the current of blood is actually impeded in some muscles, yet it is more than compensated by its unusual freedom and celerity in others in consequence of that very momentary impediment.

Every spasm, in fact, while it directly causes obstruction to circulation in the muscles it affects, must indirectly augment that process in those muscles which are at rest, as well as the surrounding tissues. Hence, the more numerous the spasms, and the greater the obstruction to the flow of blood in the muscles contracting or contracted, the freer and fuller would be the circulation in other parts. The contrary occurs

in paralysis, in which the circulation is unusually quiet and prone to congestion. Indeed, spasm—or, more properly speaking, contraction of muscles, when of moderate extent and force, being far from an unhealthy function—is one of the best resources of nature for invigorating and equalizing the action of the heart and arteries. It helps to sweep away congestions, to relieve the dull headache of deep thought, and maintain the balance of the sanguineous stream between the apparatus of one function and that of another. The convulsions preceding some cases of death, the cramps of cholera, the shakings of fever and inflammation, are salutary efforts of nature to induce reaction, although often in vain.

Contractions of muscles are not only indirectly the cause of increased general circulation, but also of the richness of the fluid that circulates; for the more frequently the muscles are moved or exercised, the more copiously the blood will fill the vessels and pass in circuit through the lungs, and be exposed to the vivifying causes. Hence the richness of the blood is in proportion to the high development, energy, and activity of the muscular apparatus among animals. The great value of a recumbent posture and perfect rest in inflammatory diseases is explicable on the same grounds. We should not here overlook the fact, that of all the animal tissues, the muscular is the readiest to manifest fatigue by exertion, and the quickest to recover tone by simple repose; as in the case of a man who may fall down breathless and exhausted after some sudden exertion, but after a time of quietude and rest, he will stand up again and move his limbs with renewed strength as if nothing had happened to him before. Indeed, whether we give him immediate sustenance or not by food, he would be sure to recover to a great extent his former muscular powers by rest alone, provided it be a case of simple fatigue, and not of debility and weakness. The one reason of this will be easily understood if we bear in mind what we have already stated with regard to the condition of circulation during muscular action. It is one of retardation and obstruction as regards the muscles in motion, and of acceleration,



fulness, and increased freedom in other parts; that is, the muscles at rest and the neighbouring and other parts; the former (retardation, &c.) interfering for the time being with due nutrition of the muscular structure, especially if a large number of voluntary muscles be engaged at once: hence the sudden induction of fatigue; and the latter (acceleration, &c.) promoting that process, when the same muscles are subsequently at repose, by refilling their vessels to more than, if possible, their accustomed extent.

The same man who is fatigued by violent exercise in going over a mile, will walk ten miles with rather improvement of strength by *gently* using his muscles, so that by sufficient alternate repose there is time for their nourishment being carried on with increased vigour during perambulation.

We shall now see how the circulation is affected in the three varieties of spasms we have already described, characterizing muscular disorders with contractility in excess.

In the *complete existent spasm* or contraction, when of some extent, the state of the general circulation must be one of excitement and reaction, or at least there would be a tendency to that desirable end. The former is instanced in the rhythmic motions of hysteria, in insanity, in some cases of cholera, &c.; the latter in the cramps of cholera and convulsive shakings from loss of blood, &c. Here the spasms being complete and confined to particular sets of muscles, while others are fully relaxed, readily supply all the conditions favouring an easy flow of blood through the remaining tissues.

In the second variety of spasm, however, viz., that of *partially coexistent spasm*, the circulation must be more or less impeded in consequence of the partiality and universality of contraction. Here nearly the whole of the voluntary muscles being moved together, though partially, and contraction being always attended with more or less arrest of flow of blood in the muscle while it lasts, it follows that during a convulsive fit the general vascular system would have to bear this overload. Hence the great oppression experienced by the heart

and great vessels, and the invariable presence of the following symptoms in the disorders which are characterised by the present form of spasm, viz., throbbing of the large arteries, as the carotids, tumultuous action of the heart, full bounding pulse, injection of the mucous surfaces, projection of the veins, bloated face, &c. Had the spasms here taken place with their normal full succession, and alternately, after perfect relaxation and some degree of repose, we could never have met with those outward morbid phenomena. In violent exercise inducing fatigue, the same state of the circulation occurs to a certain extent, owing to the rapidity of the motions being so great as barely to allow any repose between one contraction and another, a circumstance so necessary to the due adjustment and uniform distribution of the heart's action, the cause of the improvement of health by moderate exertions.

On the other hand, in the *complete coexistent spasm*, where there is no actual contraction, that is, shortening of fibre, and consequently no mechanical interruption to flow of blood in the muscles themselves, the general circulation is the least disturbed; the heart beats calmly, and the pulse is slow and quiet, as in a person in profound sleep. In short, a case of catalepsy affords by contrast the best proof of the truth of the doctrine we have been advocating, that muscular action plays a most important part in preserving and regulating the due activity and balance of the general calculation. When the body is perfectly quiescent, as in sleep, or the muscles so equally charged with their contractile sense as to render motion impossible, as in catalepsy, the action of the heart goes on sluggishly and imperceptibly, as in a cold-blooded animal; let the same muscles be moved, however slightly, and at once there is a sensible change produced, both as regards the frequency and force of the sanguineous current, which we could in no way explain, unless we attribute it to the agency of muscles in a state of contraction. We cannot say it is owing to increased nutrition and augmented tissue change, which are no doubt actively carried on in some forms



of muscular action, as during gentle exercise; the rapidity and disproportion of the excitement are fatal to this hypothesis; and besides, had the latter been true, we ask how is it that fatigue is so easily induced and that an animal becomes suddenly exhausted and breathless after some violent exertion, as in running away to escape danger.

The same state of the circulation which prevails in convulsive diseases is also to be observed in rheumatism, which in our opinion, appears to partake more of a spasmodic character than any other, although the spasms may not be perceptible in ordinary cases. I have lately met with two instances in which visible contractions were superadded to the usual symptoms of the disease. In one the muscles of the thigh were continually twisting and wriggling, as if a number of serpents were coiling up and writhing with pain tightly enclosed in a bag of muslin. In the majority of cases, however, the contractions are partial, being limited to particular parts of a muscle or fibre, and either stationary in the same spot, or being momentarily and quickly succeeded by others, undulatory and wandering from one part of the fibre to another, or from fibre to fibre. Whatever may be the manner in which these contractions take place, it is certain that they give rise to some interruption to the circulation in the muscles in which they are seated, and to a corresponding exaltation of it in the neighbouring parts, viz., the muscles at rest, the free surfaces of synovial membranes, the skin, &c.

When a few muscles are thus affected, say those of the arm, it is the nearest joints that usually suffer, as the elbow and the shoulder, which receive an undue share of blood in consequence of the partially impeded circulation in the adjacent stiff or partially contracted muscles (local rheumatism); but when many of them, as the muscles of every member of the body, act in morbid concert, not only the joints generally, but the skin also participates in the process of the disease (general rheumatism and rheumatic fever). In a great number of cases the disease assumes a wandering character, attacking distant muscles and joints in succession; this may

be supposed to occur in the following manner. We have said before that a consequence of obstructed circulation in some muscles is the exaggeration of it in others, and that while the nutrition is deficient in the former, it is more than sufficient in the latter; in one the contractility is being gradually worn out, in the other, on the contrary, it is being abnormally raised. Such being the case, it cannot be a matter of wonder if contractions abruptly cease in the worn out muscles, and appear in those hitherto at rest with an excess of muscular sense, and thus reinstate the disease in a new seat.

The spasmodic nature of rheumatism is further confirmed by many therapeutical considerations. For instance, it is a well known fact that rheumatic joints become more painful at night. This is what we should have naturally expected, for cold increases contractility, and heat reduces it, and what is there to strike us as strange if the approach of night, by its increasing cold or coolness, augments the suffering of the patient, and the warmth of the sun comparatively relieves him during the day. Again, pressure and shampooing relieve the cramps of cholera and colic pains. Is it otherwise with rheumatism? Opium and other narcotics are as beneficial in rheumatism as in colic and convulsions generally; the same may be said of tartar emetic. Further, rubefacients, stimulating liniments, and frictions are used with equal advantage in rheumatism and spasmodic complaints. These facts will suffice to show that rheumatism consists essentially of spasms, or partial irregular contractions, which, by disturbing the balance of circulation between the muscles and joints, give rise to its various characteristic phenomena. All ordinary convulsive disorders often commence with stiffness and rheumatic pains, and when passing away end in the same phenomena. Gout must come under the same category as rheumatism as regards the condition of the affected muscles.

## CHAPTER VIII.

## MUSCULAR SENSE CONTINUED. INVOLUNTARY MUSCLES.

THE muscles of organic life as they are called, are under the immediate government of the ganglionic and spinal system of nerves, which take notice of and direct all their phenomena in health and disease; the intervention of the will being unnecessary. Thus, the motion of food in the alimentary canal, and of blood in the blood vessels, is usually effected without any voluntary effort or consciousness on the part of the individual, and yet the impulsion of these materials is none the less subject to a common control of the nervous system. An impression is made on a sensitive surface and quickly conveyed to the spinal chord or ganglia as centres of reference, where it undergoes some modification or change; it is thence reflected by motor nerves (spinal and ganglionic) on the different involuntary muscles, the result being immediate contractions of the latter and organic movements. Between the voluntary and involuntary muscles there is ordinarily this difference, that while in the former the stimulus or cause of motion is the agent itself, and proceeds from the central mass of nerves (*brain*); in the latter, on the contrary, it is an extraneous agent, as it were, and comes from beyond those central masses, from some part of the periphery of the body; in one the motor nerves alone, in the other the sensitive also, are called into requisition in the act of contraction. We shall begin here with the muscles of the alimentary canal.

Our object at present is not to discuss the different diseases to which that tube is subject, but to trace those muscular phenomena which exhibit themselves as part of those derangements; for instance, we shall not stop to enquire into

what indigestion is, but what spasms this disease excites in the bowels by sending into them badly prepared chyme.

The pale muscular fibres composing the alimentary canal are disposed principally in two directions, longitudinally and spirally, and therefore admit of two motions, viz., the longitudinal or peristaltic, and the concentric or vermicular; both being essential to the proper commixture and propulsion of the alimentary contents. The longitudinal fibres, when they contract, have the effect of shortening the tube and pushing the nutritive or fæcal cylinder onward, assisted partly by the spiral fibres which narrow the intestine, so as to act as a sort of wedge or lever behind the mass to be moved. These last fibres may in this respect be considered as answering the purposes of valves to the alimentary tube, so as to determine the motion of the fæces in a particular direction; this is perhaps the reason of their generally spiral form, in order that the valvular surface may be as extensive as possible.

The longitudinal fibres being the longest will send food or fæces, as the case may be, to a greater distance and more rapidly than the circular or spiral; and perhaps on this account the relative distribution of these two kinds of fibres differs in different parts of the alimentary canal. For instance, where force and celerity of motion are necessary, as in the gullet, in which a morsel, if delayed, would produce inconvenience and danger by pressure on important parts, we find the longitudinal fibres are proportionally increased in number, length, and strength. On the other hand, where protraction is our object, they are seen to be comparatively few and short, as in the small intestines. In the large intestines again they show a goodly muster, collecting into powerful muscular bands, in order that the now hardened rollers of excrement may be passed on with as much promptitude, ease, and comfort as possible. Indeed, our beneficent Creator's wisdom is displayed in the perfection and simplicity of design of the construction of the alimentary canal, the fundamental characteristic of all animals.

We need not here repeat our conviction that the pale fibres belong to the ciliary type of muscular structure, being, as it were, enlarged and lengthened cilia.

The muscular sense of the alimentary canal, or its contractibility in excess, may be supposed to manifest itself in the following ways: viz., *first*, by constant maintenance of spasm in the same part without any succession below or above; *secondly*, by contraction, with rapid downward succession; *thirdly*, the same with inverted succession; *fourthly*, contraction, with both direct and inverted succession; and *fifthly*, by predominance of the circular over the longitudinal contraction, or the latter over the former.

The first is met with in cases of impactions generally, in which a foreign body of unusual size is attempted to be passed through the intestines or gullet, as concretions in any part of the intestines, and an immensely large dry morsel of food, or a piece of bone, or any other foreign matter stuck in the throat. In these the contraction is not only excessive and persistent, but limited to the seat of the impacted body, although the walls of the tube surrounding it may be more or less forcibly distended.

Contraction is subsequently excited both above and below the seat of impaction.

These contractions are characterised by twisting, screw-like pains, as pains attending intussusception and also prolapsus ani, in which the muscular tunic of the rectum presents a similar condition, excepting that the cause of obstruction is a portion of the bowels instead of a foreign body. For the sake of uniformity we shall call these *involuntary existent spasms*.

The second mode in which excessive contractibility shows itself is by contraction with rapid downward succession. This is observed in lientery, diarrhœa, dysentery, operation of purgative medicines, &c. Here the food, scarcely digested, or whatever is to be discharged, is passed, as it were, with a railway pace from the duodenum to the rectum, or from one part of the bowels to another. The intestine affected by this species of spasm will look like an hour-glass, the narrowest



part being the seat of the quickly succeeding contraction; these may be called *naturally successive contractions or spasms*.

In the third kind the contractions follow each other in a direction the reverse of the last, being from below upwards, as may be seen in vomiting from over-feeding, cholera, indigestion, poisoning, emetic action, hernia, intussusception, &c. In these cases contractions succeed each other with great rapidity, but in an ascending series, so as to impart to the alimentary canal the appearance of a funnel, the base being turned towards the mouth and the apex formed of the contracted portion. These may be termed *unnaturally or invertedly successive spasms*.

In the fourth variety contraction takes place with succession; in one part natural, in another inverted. We have reason to suppose that cases often occur in which the intestinal tube contracts at two points, not far from each other, at the same time and in an opposite direction, viz., from above downwards, as well as from below upwards, so that the faecal mass, which is the immediate cause of its action, cannot move in one way or the other, and becomes, as a matter of course, firmly fixed. In other words, contraction is simultaneously excited at both ends of the faecal cylinder, that at the upper end pushing it downwards and that corresponding to its lower extremity urging it upwards. Thus the beneficial purpose of the one is counteracted by the perverted direction of the other. Who can say that such is not sometimes the real condition of the alimentary canal in diseases in which constipation is one of the chief symptoms? What is the condition of the bowels in colic, ileus, violent constipation, &c.? Perhaps the intractable confinement of the bowels in tetanus and hydrophobia is referable to the same cause in an intense degree, which in a milder form produces the costiveness of hysteria, chorea, epilepsy, &c. We shall name this *involuntary co-existent spasm*. In *co-existent spasms of voluntary muscles* the latter act round a bone; in the *involuntary co-existent spasms*, however, the



purpose of the bone is answered by the enclosed mass of feces.

The fifth, or the last form of excessive contractility, is characterised by predominance of either the circular or longitudinal contraction only. We have no doubt that the circular or spiral fibres of the alimentary canal, and other similar tubes, are sometimes subject to contraction independently or in excess of the longitudinal, as may be supposed to be the case in the spasmodic stricture of the cesophagus and also of the rectum and colon, the moniliform contractions of some cases of constipation, the constriction of the bronchiæ in asthma, &c. We are not acquainted with any instances in which the longitudinal fibres exceed the circular in the force of their contraction. Perhaps globus hystericus is not an imaginary affection, but depends on the contraction of the long fibres of the cesophagus, pulling the latter up in the form of a ball in the throat, under the pharynx.

The muscular sense of the alimentary canal may sometimes become excessive by accumulation, as of other muscles, in virtue of the inherent nature of muscular contractility, which will therefore survive in muscles after their nervous communication is destroyed, provided their circulation and nutrition could be maintained as usual. We have found this law hold good with regard to voluntary muscles, as in the limbs of the hemiplegic and paraplegic patients. The same, in our opinion, applies equally to the case of involuntary muscles. When any portion of the intestinal tract is deprived of its nervous protection, and the due regulation of its motor sense is thereby interrupted, the contraction that will now follow the application of stimuli would, as a matter of course, be irregular, being either slow or abrupt, or of natural or inverted order; and the muscular tunic may sometimes be so over-excited as to fall ultimately into a state of sarcois palsy and death by latent inflammation and gangrene. For examples of this condition of the intestines we should look to certain cases of paraplegia, hemiplegia, and injuries of the spine involving the spinal marrow, in which

the uncertainty of action of the bowels is a most prominent symptom, they being either loose or costive, or these states alternating with each other. No doubt other causes here co-operate to produce these results, such as the unhealthy sensibility of the canal, undigested food, &c. ; but the muscular coat is primarily in fault.

It should be here remarked that in the generality of instances the variety of spasms above described would be found either to accompany inflammation, or to border on that process in the intestines, and that the slightest additional cause, or persistence of spasm, would give rise to the most formidable consequences, as copious effusion of lymph, mucus, pus, or blood, ulceration, mortification, &c. These untoward events are brought on by the great disturbance of circulation, from which the intestines suffer in a state of spasm. In the voluntary muscles, as we have shown before, the circulation is very much impeded and retarded in contracted muscles, and is unusually free in those that are relaxed, and in the neighbouring parts. The same phenomena attend the action of involuntary muscles also, especially in the intestines; so that every contraction of the latter, while it offers resistance to the flow of the blood in the seat of spasm, allows the same to pass more freely in the adjoining relaxed parts, and particularly in the mucous membrane, the nearest and the safest surface of relief to the point of obstruction. What a beautiful and wise provision is this in the economy of nature, viz., that every contraction of the alimentary canal should necessarily cause a determination or increased fulness of vessels in the nearest mucous membranes; that the secretion of gastric juice and of the succus intestinalis is inseparably connected with every movement of the stomach and intestines; that food excites the churning motion of the stomach, and the churning motion tends to the throwing out of the solvent principle of digestion. Does not a purgative act in a similar manner?

In many lower animals, as in the soft-skinned naked annelides, such as the earth-worms and mollusea, like the snails,

a glistening gelatinous secretion is abundantly poured forth from their surface when these animals are crawling along, which often marks their trail. This is evidently caused by muscular action.

During purgative action the intestinal canal is invariably thrown into a state of inordinate contraction, either moderate or violent, before the loosened or watery motion occurs, thereby causing determination to the mucous membrane, which must precede every act of exaggerated secretion from its surface.

Vomiting is attended by the same phenomena.

A few words on the probable manner of formation of scybalæ, or hard nodules of fæces met with in the intestines, may not be quite misplaced here.

Various hypotheses have been advanced on the subject. One of these is, that they are the result of an aggregation, particle by particle, upon a primary nucleus in some recess of the intestinal canal for a considerable length of time. We are of opinion, however, that these pent-up masses are not necessarily of so great an age, but are formed quickly by the inordinately forcible action of the spiral fibres upon solid excrement, cutting it up, as it were, into little bead-like bodies, like the dung of a goat, which are afterwards sheltered in the cells of the colon. It would be interesting to inquire whether the spiral fibres in the intestines of the sheep and goat exceed in number and strength, in a given length, those in man; if they do, it would afford some confirmation to the view we have advanced.

#### *Defective Muscular Sense of the Alimentary Canal.*

The muscular tunic of the alimentary canal is subject to a deficiency of its inherent contractility perhaps as frequently as any other muscular structure. This defect shows itself only partially; that is, while the tube is robbed of its power of contraction in one part, it enjoys it in its full degree in the rest of its course. Thus in dysphagia the pharyngeal

muscles may be in a state of atony, while the stomach and intestines remain in beautiful order. The stomach not unfrequently shows symptoms of defective muscular power, its fibres become pale and attenuated, and it yields to enormous distension, as in phthisical patients. There is a form of indigestion in which muscular debility (that is impaired contractility of the stomach) is the chief element of the disease, although it is commonly confounded with its indirect effects, such as diarrhœa, dysentery, &c. It is characterised by nausea, a constant feeling of coldness, weight, and sinking in the pit of the stomach, cold extremities, pulse low, and extremely irritable, pale countenance, and a hollow resigned gaze. There is seldom any vomiting; if any, the stomach least participates in it, and it is followed by alarming exhaustion. To these may be added complete inappetency and incessant unquenchable thirst.

The intestines, both large and small, form no exceptions to the general rule, and their defective contraction is a source of many of our ordinary ailments. Perhaps by far the greater number of cases of constipation and colic daily met with are attributable to this cause.

It is not uncommon to find the upper bowels completely empty from excessive action, while the lower portions are sluggish and loaded with fæces from an opposite condition, and *vice versâ*. Habitual costiveness is generally induced by torpor of the colon and rectum.

Contractility of the alimentary canal may also be perverted, both in excess and defect. Perverted in excess, it is recognised in the screw-like spasms of colic and icterus, globus hystericus, gout of the stomach, griping, tenesmus, &c., and the same in defect may be seen in the feeble action of the intestines in colliquative diarrhœa, black diarrhœa of typhus, tympanitis, &c.

## CHAPTER IX.

SIMILARITY OR CONTINUITY OF FUNCTIONS OF  
ANIMALS DEDUCIBLE FROM THE SAMENESS  
OF MATERIAL IN THEIR GENERAL STRUCTURE,  
OR *VICE VERSA*.

By material sameness of animals or their structure we mean that every animal is fundamentally made of one and the same substance or tissue, however diversified that substance or tissue may afterwards appear in different animals, and the different parts of the same animal. If the material out of which the organs of animals are formed be proved to be the same everywhere, being differently fashioned and modified according to the particular indications to be fulfilled, it will follow that these indications or functions must originally be the same or of the same type also.

We shall endeavour to determine these two points before proceeding to discuss the morbid conditions of the vascular and nervous functions.

We have formerly observed that between the cilia, simple cells, red corpuscles, the tubular embryonic heart, and the sarcous corpuscles of striated muscles, as regards the plastic matter of which they are composed there is essentially no difference. They differ in form, shape, and situation, and degree of condensation, according to the various positions of animals and the medium in which they live; but they are all homogeneous, consist of the same molecules, and are endowed with the same contractile sense. In the advanced heart and blood-vessels, and the alimentary canal of higher animals fibres are developed to impart more precision and force to their several actions, but yet the fibres are made up of the same primordial matter, and possess the same contractility. Further, analogy leads us to suppose that the nervous system,



which resolves itself into tubes and cells, is not originally formed of a different animal substance; that is, that the nervous tubules and cells do not present an exception to the general rule, but they are also constructed of the same uniform, structureless matter, which constitutes the *substance of the corpuscles of muscles, the simple dorsal vessel of animals, the red corpuscles, &c.* Perhaps, they are more finely and delicately made to accomplish their superior destiny in the animal kingdom. Again, the chemists inform us that fibrin enters largely into the composition of muscles, and albumen into that of the brain and nerves, but we well know how intimately these two compounds of protein are allied to each other, and how one may easily be converted into the other in the laboratory of nature. So far, therefore, as we have yet examined the question before us, our assumption that the animal principle out of which most of the structures of animals are built is fundamentally the same, homogeneous, and irritable, does not seem to be improbable. But we may go further. Not only the animal textures are composed of the same material, but the three great organic systems of animals, viz., the alimentary, circulating, and nervous, are built upon the same plan.

The most essential part of an animal, without which it cannot exist, is its alimentary canal,\* or a gastric tube, which is either almost structureless, as in many of the infusoria, or surrounded with fibres, as in the intestines of mammalia and other animals. To this other tubes and cells, simple and complex, and similarly formed, are superadded (vessels and nerves), with a view to prepare from the products of a crude digestion a material adapted to a higher and complex life. In other words, an animal either possesses a single digestive apparatus, as in the invertebrata, without a

\* In some animaleules, as in the anenteræ, no such organization as an alimentary tube or cavity is detectable, but they are still known to receive food into their interior and exuviate indifferently from their surface, and this passage of foreign matters in and out must be viewed as analogous to their course through a perceptible gastric development, which suffices for our present purpose, and sustains our argument.



vascular or nervous system, or a compound form of digestive machine, as in those animals provided with vessels and nerves, the latter two being considered as higher forms of alimentative organs. We shall now see how far this theory is true by a comparative examination of the three great systems of function, viz., digestion, circulation, and innervation; how far they resemble each other, and wherein they differ; and whether an intimate agreement between them should not be received as a further and more conclusive evidence of the uniformity of animals, both as regards the basis of their different tissues and their general mechanism.

*Sameness or Continuity of Animal Functions, and their Uniformity as regards their General Mechanism.*

The office of the heart is to propel and receive blood to and from the lungs and the whole body. It is the same to the vascular as the stomach is to the alimentary system, both being recipients and expellants of their peculiar aliments, viz., the chyle and the common food. The food in its descent is mingled with saliva and gastric juice to undergo chymification, and afterwards with bile in the duodenum, to suffer chylicification; the chyle thus prepared is then sent down to allow of its nutritious parts to be absorbed by the chyle vessels, and the inert, useless part to be thrown out as excrement by the lower bowels. In the same way chyle, the food of the heart, may be said to be chymified by commixture with the venous blood in the right auricle and ventricle, and the arterial side of the lungs, and chylicified in the venous side of the lungs, the left auricle and ventricle, and arteries, by exposure to oxygen, &c. We have now the cardiac chyle (pure arterial blood) circulated through the capillary channels, along and around minute cells and fibres constituting the different organs and structures, and constantly exuded from their permeating walls, as if to induce those constituent parts to appropriate the blood chyle as much as is consistent with their well being, and excreting and secreting organs to remove

what is obnoxious and to elaborate what is congenial to some healthy purposes of nature, the remaining blood serving as gastric juice, as it were, to a second course of chyle, the cardiac aliment. In simpler language, suction of the chyle may be compared to the swallowing of the common food, its transmission to the right side of the heart and mixture with venous blood to the descent and chymification of a morsel in the stomach; exposure of this mingled chyle to oxygen in the lungs, left side of the heart, and arteries, to the ordinary chyfication of food by contact with the bile in the duodenum; passage of the blood through the capillaries to motion of chyle in the remaining small intestines; exudation of the nourishing part of the blood and its appropriation by the constituent parts of the body to absorption of chyle by the chyle vessels; and, lastly, the removal of the noxious portions of the blood by the secreting and excreting organs to defæcation by the large intestines. These two functions, therefore, viz., the vascular and alimentary, correspond with each other in their most minute details, the former being, as it were, an extension of the latter for the preparation or conversion of chyle into blood, required to support the superior organization of a vascular animal; or the vascular system may be supposed to be a higher form of digestive apparatus, or a highly organised parasite placed over one lowly endowed, as the alimentary canal.

The alimentary machine prepares food of a lower plasticity suited only to the lowest forms of animal life, as the inferior radiata; the cardiac system added redigests this comparatively coarse food, and renders it more plastic, for the support of beings higher in the scale. The first digestion we shall simply term *alimentation*, consisting of prehension, mastication, deglutition, chymification, chyfication, and defæcation; and the second may be more appropriately named *re-alimentation* in preference to circulation, as being more expressive of the true nature and object of that process, and would comprise suction of the chyle and lymph, their mixture with venous blood, the motion of this mingled fluid

through the vascular system, and the changes it undergoes in its course, *conversion into blood, assimilation, secretion, &c.* We need here scarcely repeat that *alimentation* is the most universal and necessary function of an animal, without which, in short, no animal existence is possible. It is the basis, and *re-alimentation* a superstructure.

A question now arises, does the alimentation process cease in re-alimentation, or is it continued up to a further stage? Our answer is in the affirmative, and we have reason to conclude that the digestion of food goes on still further into a finer and more subtle material in the nervous system.

When the constituent cells and fibres are fed upon the products of re-alimentation, they are no longer like those of the lowest forms of animals, which have no blood-vessels and live only on one digestion; their vitality must be considerably enlarged from a more concentrated nutrition, and a greater complexity of structure; they act with more precision and vigour, and enjoy an individual activity which is, as if it were, too much for them to wield with safety and benefit to their general well-being. This over-activity of tissues, excessive vitality, redundant force, too much animal electricity, the fruit of a double digestion, let us call nervous aliment (as we had chyle for the food of the vascular system, and bread for that of the alimentary canal), and bring this aliment, this powerful inherent sense of animal constituents into contact with the extremities of afferent nerves (as chyle into contact with chyle-vessels, and common food into contact with the mouth), and then carry up the impression in which shape it there appears, by the same nerves to the nervous centres, for its peculiar digestion by the powers innate to those centres (as chyle and common food in the lungs and left side of the heart, and stomach). The moment it reaches the grey matter of the brain, it produces a crude sensation, which, for the sake of analogy, we would name the chyme of the nervous system; this undergoes a further change to become a clear and definite sensation, corresponding to ordinary chylification and conversion of chyle into blood, and thus

refined, it is afterwards disposed of into several motory, organic, and mental impulses (as blood in secretion, nutrition, &c.), by which not only the harmony subsisting between the different parts of our animal frame is maintained, but our relations and intercourse with the external world are infinitely extended.

What we have already said would make it sufficiently clear that the three animal functions, viz., the nervous, vascular, and the alimentary, are similar to each other in the most minute details. It would be more rational and philosophical, however, to consider them as parts of one great function (*alimentation*), of which they form each a stage for the conversion of crude food into chyle, blood, and the nervous essence, including the resident sense of tissues.

That the coarse, animal or vegetable food, we daily consume, passes through these three grand transformations, few who have the least knowledge of the economy of animals will question. When we say food undergoes three kinds of changes, we only mean certain products and forces are derived from it by vital operations. Our ordinary diet consists, chemically considered, of oxygen, hydrogen, nitrogen, carbon, sulphur, phosphorus, potassium, sodium, iron, &c. We are all aware that in simple alimentation (digestion by the alimentary canal), only those elements or proximate principles are selected which can supply the various natural demands of the system. The portion of the food thus selected becomes, after passing through certain changes in the vascular apparatus (we need not inquire what these changes are, whether by addition or subtraction, or both), pure blood which nourishes the tissues.

The principal animal tissues will, on analysis, yield oxygen, hydrogen, nitrogen, carbon, light, heat, electricity, &c. As they are being constantly wasted, repaired, and replaced in the living body, it is not improbable that a certain animal force is generated out of the elements above enumerated, along with those changes which afterwards imbue and pervade the animal frame. We have distinguished this

force as the resident sense, and also as nervous food by analogy, in want of a better name. It is not material and ponderable, like chyle, the food of the heart, nor the still coarser food of the stomach; it is an energy that cannot be recognized independently of the living tissues or their vital phenomena. It may be a compound of light, heat, electricity, or light and electricity, or the latter alone, or all of them put together in one animal force, or it may consist of some principles still more subtle, hitherto undiscovered, for who knows what future discoveries may not yet bring to light? Be it, however, as it may, it is plain that it is derivable from the food we originally take, and the chyle and blood we form, and that it is owing to this easy and direct supply that our vital and corporeal spark is not only maintained, but able indefinitely to multiply and extend itself. We cannot say it is a power *sui generis* for we know it is diminished by want of food, and kept at its healthy proportion by the diet being sufficient. The nervous digestion may be denominated *super-realimentation*, as indicating a still higher digestion of aliments than what takes place in the vascular system.

Various other facts may be adduced from comparative anatomy and physiology in support of the doctrine we are advocating, that is, that the nervous, the vascular, and the alimentary systems, are not only built upon the same plan and out of the same material, but perform a common function in its three corresponding prominent phases. In order that no further doubts may remain on the subject, we propose, in this place, first, to take a brief general survey of the progress of organization in animals; how the simplest forms gradually give place to the most complex, and how the apparently complex structure is in reality a repetition of the simple; and afterwards to consider the nature of the animal organic motions.

*First, a General Survey of the Organic System of Animals.*

In the simplest and single-celled animalecules, all we find the creature to be possessed of, is a soft, contractile, homo-



geneous cell, with an orifice for its mouth, surrounded with a few cilia; these beings, as I said before, live upon the products of a single digestion, the jelly-like condition of their lowly forms not requiring a higher form of nutriment. Still, humble and microscopic as they are, they display all the attributes of living creatures in an eminent degree. They secrete a sort of gastric juice to act upon their simple food, they propagate their species as most other animals, and not unfrequently excrete a coat to defend themselves against their more powerful neighbours; thus, their few wants are so well supplied, that a superaddition of structure would not only be an unnecessary encumbrance, but a positive infliction.

Rising, however, higher in the scale, where complexity of structure is introduced by the addition, super-imposition, and modification of more cells, and the relation and wants of the animal are farther increased; where there is a distinct well-formed anal orifice and the homogeneous tissue is cut up into an arrangement of fibres; and lastly, where the creature is more powerful and food proportionally precarious, although its consumption continues ever incessant, we must be prepared to expect an equally suitable provision made in the animal's mechanism for the better and more economical fulfilment of its numerous additional wants. Here the object of the animal is not only to economize and store up, as far as possible, the redundant nutriment of an uncertain enormous meal, but to raise it to a higher standard of plasticity which its superior destiny necessitates. This purpose can only be accomplished by the establishment of a second digestive apparatus, that is, a vascular system. Hence, the necessity of the formation of tubes by elongation and coalescence of primary cells, first, to suck the gross fluids by veins; secondly, to collect these several small streams into a larger one (as in the right side of the heart); thirdly, to expose it for purification and refinement (in bronchiæ, gills, lungs, &c.); and lastly, to send it back by another trunk (left side of the heart) to the hungry body.



We must not here lose sight of the fact that the heart in variably commences by simple sucking veins where it finds its peculiar food to suck in, just as the alimentary canal begins from the mouth, or its first contact with common aliments, and terminates where assimilation, secretion, &c., take place, which in the case of the common digestive organs, is the surface of the jejunum, ileum, colon, and rectum. If these two systems, therefore, begin and end alike, we cannot but naturally conclude that their functions are analogous also, if the vascular system be not simply an extension of the digestive, the latter acting on raw food, and the former on a prepared material (chyle) derived from that food.

The formation of the nervous system is almost coeval with that of the vascular. When the body is supplied or fed with a highly-seasoned and concentrated material, as the blood, the inherent sense of its constituent members becomes, as I have before stated, necessarily excessive and more energetic, and economy and its general well-being render it necessary that this surplus sense should be collected, ground, and digested, and when thus properly refined, distributed to different parts of the body according to their wants. We should, therefore, have one part of the nervous system as collectors of the super-resident sense, another for its digestion, and a third for its due distribution or transmission. Now, have we this threefold division in the nervous system of an animal, or not? We cannot say we have not; for we all know, the use of the afferent nerves is to collect information, impression, or resident sense, excited or natural, and that they are the first with which an animal is endowed, the ganglia, the grey centres, and the efferent nerves being, so to speak, after formations, as the left side of the heart and arteries.

We do not, hereby, mean to affirm that there is necessarily a great interval of time between the appearance of one set of nerves and that of another; all we here maintain is, that they observe a certain order of succession in their action, corresponding with what we have already recognized in the vascular and the common alimentary systems. The nervous

function at first commences from its afferent side, the analogue of the veins and the chyle vessels of the vascular system, and buccal extremity of the alimentary canal, and end in its efferent periphery, the counterpart of the capillary vessels, as well as the anal termination of the intestines. In other words, as it is impossible for the alimentary and the vascular functions respectively, to be without a buccal orifice, and chyle vessels and veins, to admit the reception of their proper food, so it is for the nervous phenomena, the exercise of which is invariably preceded by suction by the afferent nerves of nervous aliment, viz., the superabundant resident sense of tissues. The ganglia and the grey centres digest this food for the different purposes of sensation, motion, and the intellectual operations.

Such are the facts deducible from a rational generalization of the knowledge we derive from physiology and comparative anatomy. We see here that the nerves feed upon the resident sense, the product of re-alimentation, that is, circulation, in the same manner as the vascular system feeds upon chyle, the product of simple digestion, and the alimentary canal upon common food, the product of vegetation. That these three systems all start from the same point, viz., their first contact with their peculiar food, which they change into simpler and more potential forms according to their relative position in the animal, and also, that their general course and disposition are similar. Is it not, therefore, more reasonable to infer that the nervous, the vascular, and the alimentary systems are constructed on a common plan for the continuation of a great function, *alimentation*, which is an essential attribute of all animal life?

Before adducing further proofs of the uniformity or continued unity in the method of structure and functions of animals, we shall presume here to lay before our readers a faint idea of the grandest of all digestions, the final stage of alimentation yet arrived at, which we shall call spiritual digestion or *alimentation*.

Spiritual alimentation has for its object the provision of a happy future, and its discussion therefore exceeds the boun-

dary of medicine. Nevertheless, as the past is for the present, and the present for the future, with which we are all necessarily concerned, it is desirable that we should at least know what it is.

By the process of common alimentation or digestion by the alimentary canal, we derive chyle and fæces, and that of re-alimentation; that is, digestion of chyle by the vascular apparatus, blood (cardiac chyle) and excretions (cardiac fæces). In the same manner we ought to recognize as the product and exuvie of nervous digestion, voluntary mobility, sensibility, and intelligence, and the nutritive, secretive, and excretive forces which are being constantly operated on, and expended in the body, as respectively, the chyle and fæces of nervous digestion. Indeed, the mental powers, as they are collectively called, are, strictly speaking, a lump of food for the soul to act upon; they are as obedient, passive, and mouldable as the common aliment, chyle, and resident sense; and they admit of being more or less, or degenerated, as the usual diet, &c. We can, therefore, assign no other use to them than to be mixed by the principle of the soul with universal matter and the spirit finite and infinite (as the common food with gastric juice, and chyle with venous blood), under the purifying superintendence of reason and moral sense (as chyle under exposure to bile, and venous blood under the action of air), in order, first, to obtain that finite knowledge of which we have need in our intercourse with the present world; and secondly and lastly, that imperishable, pure, divine knowledge, in which habited alone, as a robe of emancipation or resurrection from sin, we dare, can, and shall appear before our Creator hereafter. The knowledge of God so derived is the last form of *chyle*, the divine food, which we offer our Almighty Father to receive His eternal benediction and peace. When we say we go to God with a morsel of food, let it not be understood that God actually eats something material from our hands. It is for the better illustration of the subject that we have been led to use the term food; and if God eats this food, He eats, be it remembered, purity,

righteousness, and innocence. Such is spiritual alimentation in a hurried sketch. Here we have a glimpse of the truth of the Word of God: "And the Lord God formed man out of the dust of the earth." From dust, the vegetables prepare grain; from grain, we first of all elaborate chyle; from chyle, the resident sense; from resident sense, intelligence (instrument or food of the soul); and, lastly, by the exercise of intelligence, under the guidance of the moral principle, which is innate to us, and of reason, a power above us (God's voice, the Holy Ghost), we derive purity, innocence, and piety; viz., divine food, in return for which we are to be rewarded with everlasting life and bliss. God is, therefore, not so far distant from us as the wicked would lead us to believe. On the contrary, He is always near us, and easily accessible by those who seek Him. When we, therefore, see the universal sinfulness and perverse blindness of man, and his utter forgetfulness of the omnipresence of the Being of Beings, we may verily exclaim:

Oh man, wayward perverted man!  
Why not your home so near, hasten!

We shall now examine the nature of the chief animal motions, as affording further evidence of the intimacy of structure and function of the four great systems of organs we have described, and their respective subserviency to one common object, namely, *alimentation* in its most general sense.

All the primitive motions in animals may be said to commence from their first contact with food in the mouth, or some sucking surface or tube equivalent to it, and end where the food is to be finally disposed of, and may be conveniently divided into *backward* and *forward*, or *retrogressive* and *progressive motions*. In point of time, the *retrogressive* is the first, and the *progressive* the last, to take place. The retrogressive motions may be seen in the passage of food from the mouth to the anus; that of the chyle and venous blood from capillaries to the right side of the heart; that of the impressions or sensations from the extremities of afferent nerves

to the brain, spinal marrow, and ganglia; and, lastly, in the reflections and contemplations of the soul.

In the same manner we observe the corresponding forward motions in the course of the chyle from the intestines into veins and chyle vessels; in the injection of blood by the left ventricle; in the propulsions of cerebral and spinal motory impressions; and lastly in our faculty of penetration, reasoning, and observation. Retrogression is always slower than progression, which, on the other hand, is more congenial and subservient to the animal, the same being, as it were, the last and most refined propulsion of force or forces in the creation at present. We cannot deny the existence of these motions in any animal, nor of their necessary origin from the first suction of food by the mouth or umbilicus; other causes may interrupt and excite, but not originate them. The recognition by nerves of the *resident sense* is a grosser motion than the contemplation of the soul; the imbibition of chyle by capillary lymphatics is still grosser, and the sucking by the mouth is the grossest of all. We must not here confound the soul with the body, through the medium of which it operates. As these motions, viz., the retrogressive and progressive, therefore, coincide with each other in all the systems of the animal, we cannot but admit that their organs must be similar also, modified according to the type and degree of refinement required for their respective offices.

Before finally quitting this subject, we beg to point out a few well-observed facts connected with the important subject of the influence of diet and air on the body and mind, which cannot fail to convince the most sceptical reader of the fundamental sameness or continuity in the general mechanism and functions of an animal.

Why does a child, badly fed and clothed, and kept in confined situations, become ricketty and scrofulous? Why is his blood so poor, his resistance to causes of disease so feeble, and why does he generally grow stupid in the mind? Why in another child, nutrition being irregular, and the brain being more vascular, and too highly excited at the expense of other organs, does it become subject to hydrocephalus, and its powers



grow precociously active? Why, again, does a child fed and brought up with care and plenty, have its body and mental powers so beautifully and symmetrically developed? Why should the too much or too little food in the stomach, and the pure or foul air in the lungs ultimately be felt in the vascular and nervous systems? What makes bad food cause cachexia of the blood and mind at the same time? Why should the Anglo-Saxon race, originally a branch of the Japhetic, or Indo-European race, excel the present Hindoos in depth, solidity, and originality of thought? These questions are absolutely unanswerable, unless it be admitted that the nervous, vascular, and alimentary organs are casts of the same mould, placed one over another for the discharge of a common function (*alimentation*); to convert the coarse, vegetable food into the refined principles peculiar to animals, viz.; chyle, blood, and resident sense; the alimentary canal being, as it were, the base or condition for the system of vessels, and the latter the base or occasion for that of the nerves. We must also admit that the so-called mental powers—especially intelligence—are nothing more than the result of a succession of digestions of the common food we daily consume. Our intelligence is a fine essence of matter, for the use of the spirit (soul) to penetrate, identify, and discriminate other matter; it is an off-set of the material, as the soul is that of the spiritual world; the one being the working tool, the other the worker. Intelligence, *being material*, at least emanating from matter—we might call it a force if we like—admits of degrees and degeneration: thus, it may be more in one person and less in another, and perhaps more or less in the same person at another moment of time. It may be excited by material ingestion as by wine, or depressed and obliterated by disease, as in torpor, imbecility, coma. Again, it is easily mouldable, as it were, into shapes; as a man living in a civilized country may, without much difficulty, be made to understand and believe a scientific discovery; while the same man if he resided in a barbarous society, will be satisfied with things in proportion as they are stupid. We do not meet with these



characteristics in the soul, which is one and finite, and of the same proportion and attributes everywhere. We cannot say, one I, The Me, is different from another I, the another Me, or my soul greater or smaller than another soul, although we differ momentarily in our minds? Moreover, the soul, wherever it is, knows the distinction of right and wrong, truth and falsehood, merit and demerit, rewards and punishments, &c. This knowledge being born with it, survives with it in the future, when the body is no longer a helpmate, nor the cerebral and the mental powers the instruments of our actions.

We believe the foregoing observations and facts will suffice to set at rest the three points which we had undertaken to discuss in this chapter, viz., first, that the material out of which an animal is formed is originally the same everywhere; secondly, that the organic systems of animals are constructed on an uniform plan; and thirdly, that the chief animal functions are in reality parts or extensions of one great function common to all animals, *alimentation*.

The red corpuscles, and the muscle, the cell, and the tubule, and the cilia, and pale muscular fibres are not, therefore, different tissues because of their different names; but consist fundamentally of the same irritable vibratile-sensitive animal material, capable of transforming other organic and inorganic matters into their own peculiar substance, in order to execute those offices which their respective positions and modifications in relation to other cells, tubes, &c., call upon them to perform; they are the distant members and relations of the same family united into a happy and peaceful republic, to raise, if possible, the dust-formed man to the dignity of a holy immortality.

The transformations which the animal tissues undergo in the progress of organization are more wonderful than those observed in vegetables. The alimentary canal in man may be compared to the root, trunk, and buds of a tree; the vascular system to its extended foliage, and the nervous system to its inflorescence and fructification. Indeed, animal morphology is the most beautiful and perfect that could be conceived.

## CHAPTER X.

MORBID STATES OF THE MUSCLES OF THE HEART  
AND ARTERIES.

WE are indebted to the researches and discoveries of many distinguished modern pathologists for a clear and practical exposition of the diseases of the heart and arteries generally, through a careful investigation of the motions, sounds, and other physical changes which accompany those lesions. For a detailed account of these, reference must be had to the several valuable treatises on the subject: all we can here presume to do is to offer a partial and brief summary of the prominent phenomena indicating disturbance of the muscular condition of the circulating apparatus.

The heart, as we have seen before, has two motions, viz., a backward and a forward motion, that is, a motion to and a motion fro, the former belonging to the right, and the latter to the left side. In the human compound heart, however, it would be more convenient to divide them into auricular and ventricular, the auricular being also retrogressive from the auricles into the ventricles, and the ventricular progressive from the apex of the ventricles into the lungs, and systematic arteries and capillaries. These motions, and the contractions which cause them, are naturally *existent* and *regularly successive*, but in disease the succession may be more or less broken and irregular, and the contractions become partially *co-existent*, so that the auricular and ventricular spasms more or less encroach upon each other. As the auricles are known to contract before the ventricles, and the ventricles immediately after, and as this order of succession is seldom deviated from in health, we must conclude that the motions of the heart take place and are carried on on the same principle as those of the intestinal canal, one contraction following another in a direct or inverted series. In the heart there is

this difference, that the exciting cause of its action is blood instead of the food or fieces, and that the completeness of its motions are in a great measure dependent on a certain valvular arrangement which we do not observe in the alimentary canal, although the latter has some mucous folds which have been called valves.

The resident sense of the substance of the heart may be excessive, defective, and perverted as of other muscles; and may be considered in relation to its contents and to the state of the valves.

Excessive muscular sense in relation to blood is witnessed in the violent contractions of the heart in plethora (sthenic) inflammatory fever, excitement of wine, sudden obstructions to the onward flow of blood, as in extensive hepatization and tubercular deposition in the lungs, &c. In many of these cases, where the cause of excitement is gradual and permanent, and the obstruction steady and progressive, as in the nutmeg liver and Bright's kidney, hypertrophy of the heart, in capacity or substance, usually both, is inevitable. The greater the obstruction, the richer the blood, and more powerful the muscular effort required to propel it onward, the bigger, and wider too, perhaps, the heart would grow by appropriating more liquor sanguinis at the expense of the other organs; this is, however, necessitated by the increased demand on its propelling power.

In pericarditis, endocarditis, and carditis, the heart acts with inordinate strength in consequence of its inflammatory turgescence.

Excessive contractility of the heart with regard to its valves accompanies all the valvular diseases, obstructive or regurgitant, attended with hypertrophy; here the increased muscular power arises from over nourishment of the heart, from the necessity there is to relieve itself of the unnatural distension of its cavities by the obstructive or regurgitant blood. The physical signs by which excessive action of the heart is known, are the unusual strength of the impulse, and the loudness and prolongation of the first sound; these signs

are extended over a considerable extent of surface in the case of a hypertrophied heart.

The contractility of the heart is defective in anæmia, emaciation, asthenic-hæmorrhage, fluxes and dropsies, extremely dilated heart, hypertrophy, with or without valvular disorganization, diseases of congestion, syncope, poisoning by sedatives, continued electric shocks, &c. In these cases the sounds of the heart are abrupt, and perhaps louder, but of short duration with little impulse.

And lastly, the muscular sense of the heart is perverted, as in structural lesions of the valves causing obstruction to the course of the blood and its regurgitation into the ventricles. These states of the heart are distinguished partly by the various murmurs they occasion, and partly by the difference of pulsations between the large arteries in the neighbourhood of the heart, and the small tubes at a distance, as between the pulse in the neck and the wrist; the latter is generally slower or intermittent.

Contractions of the heart are also either *crisient* and regular, as in simple uniform hypertrophy, or more or less continuous and *co-crisient*, as in valvular implications with regurgitation and duplicate systole.

*Complete co-crisient spasm*, or catalepsy of the heart, may be seen in the sudden embolism of that organ, producing instantaneous death in many lingering diseases.

### *Excessive Muscular Sense of Arteries and Capillaries.*

Much difference of opinion still exists as to whether the fibres of the middle coat of arteries, to which their contractility or tonicity, as it is improperly called, is due, are muscular or non-muscular. The determination of this question is of immense importance in the investigation of the morbid phenomena in which the arteries take a chief share; and we shall therefore be excused if we here make a few observations on the structure and function of those circulating tubes. To begin from the capillaries. These tubes,

viewed by the microscope, appear to be transparent, structureless and homogeneous channels; they become narrow by contraction, and swell out and are dilated by relaxation, therefore, in reality, they resemble the simple alimentary canals of the inferior polygastrica or the dorsal vessel of the embryos of the higher animals; they may, in fact, be considered as the last remnant of the embryonic growing heart, of which in the advanced animal one portion has undergone several mechanical alterations to become arteries and veins, and another received a high muscular development into cavities, or into a cavities body, if I may so express it, ordinarily described as the heart of animals. In other words, life always lives, so to speak, in the remotest and simplest forms of animal matter, and it is because of its more or less remoteness from the source of its food supply, that additions and alterations of the primitive living matter have to be made in order to carry the distant food easily and conveniently and in proper form to it. In fact, what we call a superior organization is nothing more nor less than the result of a contrivance of nature by a suitable modification of the primordial matter to bring the nourishing pabulum to the living sphere or where life really exists. The more remote the animal from the source of its gross food, or as it is offered by nature, the higher it must be as regards the complication of its structure, in order to suitably break it down, so to speak, to the requirements of its truly living constituents. The animals as they rise must again range further and further for its particular aliments, which will also become rare and rarer with the progress of advancement. In other words, as we rise higher and higher we not only leave our source of food supply so much the more behind, but we must at the same time go about farther and farther to get it. In short, the determination of the position of the animal in the scale is simply one of *how far the fine suitable aliment immediately required by its remote living parts is from the nature's gross food it can get*. The so-called "natural selection of species" is mainly determined by the same law. This view of the



nature of the circulating apparatus, however novel, is nevertheless true. The pulsating vessel of the embryo is structureless and contractile, with a capacity to grow and extend, and so is the capillary tube, the permanent representative of that vessel.

On tracing upwards in the arterial side, we come to a class of vessels which are of an intermediate character between capillaries and arteries. With the arteries they coincide in the number of their coats, but their muscular coat is considerably thicker, hence, while they are more contractile than the larger vessels of the same kind, they approach more closely the nature of capillaries, which are contractile in their whole substance. These vessels, viz., the minute, almost microscopic arteries immediately above the capillaries, may be conveniently described as sub-capillaries (arterioles). In that case the real arteries would extend from the sub-capillaries to the heart. In these (arteries), the muscular layer forms still a prominent feature, but compared to the sub-capillaries, and considering the relative calibre of both, that of arteries, it would seem to be the thinnest. If we therefore view these vessels according to the amount of contractile power each possesses, we must place the capillaries first in the list, as enjoying most contractility, the sub-capillaries next, and the arteries the last. Although the arteries and sub-capillaries are inferior in the contractile sense, this want is happily compensated for by their possession of an additional property, viz., elasticity, in consequence of layers of yellow elastic fibres introduced into their tissues. By excess of elasticity these arteries admit of an easy dilatation so as to adapt themselves to the various states of the circulation attending upon disease, which would have otherwise terminated in their rupture; while with the contractility combined, they are enabled not only to resume speedily their former calibre, but to maintain permanently an even pressure upon their contents. The dilatation of the capillaries, however, is always a vital phenomenon arising from exhaustion of their resident sense, which supposes a previous contraction. The sub-capillaries also



must to a certain extent dilate by relaxation, for their resident vital sense exceeds their mechanical elastic force. These preliminary remarks will help us to explain many important conditions of the vascular system which would otherwise appear incomprehensible. We will now proceed to examine the merits of the doctrine which attempts to prove the non-muscularity of arteries, and ascribes arterial action to some mechanical property of those vessels.

Those who maintain the non-muscularity of the middle coat of arteries must necessarily ally arterial muscular fibres with the yellow elastic tissue, and account for their tonicity by assuming or assigning to them a kind of elastic property. Our daily experience, however, shows that the phenomena of arterial action are not of simple elastic tension, but of pure muscular contraction. For instance, it is an undeniable fact that arteries including capillaries, and sub-capillaries, contract by cold and dilate by heat. Now, we cannot understand how this contraction and dilatation can be explained on physical principles, that is, by the agency of heat and cold on the simple elastic fibre. It is perfectly intelligible to us how these agents affect the volume of matter by causing a dispersion, or closer approximation of their particles. Heat raises the elasticity of water by converting it into steam, and cold decreases it by condensation. But the law holds only with dead, or inorganic bodies, held together by the simple attraction of cohesion, and which admits of being more or less elastic according to temperature and pressure. The elasticity of living organized bodies, however, is always of a certain proportion and cannot be more or less without injury to their integrity or loss of vitality. Neither can heat, properly speaking, sever their particles, nor cold tighten their union so long as the vital principle animates their substance. How are we then to explain the action of heat and cold upon arteries? Is the narrowing of the artery from the application of cold, a result of a less degree of elasticity in consequence of loss of temperature, and its relaxed condition that of a heightened amount of the same

physical force owing to additional heat. Do the arterial fibres by the contraction and relaxation of which vessels grow narrower and wider, actually become condensed while acted on by cold, and expanded when under the influence of heat, as we see in the case of gaseous bodies. Even if we allowed such physical changes, how could the reduced bulk of the arterial fibres in one instance and their enlarged size in the other give rise to the conditions of vessels we are alluding to, they would rather tend to produce opposite results, cold instead of narrowing will widen the arterial calibre.

Again, other agents excite contraction in arteries, as spirit of wine, capsicum, &c., as any one may observe in the frog's web under the microscope. Do these agents increase or decrease elasticity? How do they then cause arteries and capillaries to grow narrower, as they certainly do? The doctrine of elasticity, therefore, as the sole cause of arterial action, must fall to the ground, and its advocates should come down from their high seat of presumption to submit to their rational opponents, who, while they do not deny elasticity, recognise a high degree of muscularity or contractility in arteries.

Many other facts may be cited to prove that the arteries enjoy a high degree of muscular sense, which resides in their middle coat and the substance of the capillaries, and consequently increases as we proceed from the heart, and as the elasticity decreases.

Much unnecessary confusion has been introduced into pathology by the substitution of the word "tonicity" for "contractility" of arteries; some even contend that irritability and contractility are one and the same property. According to this doctrine, instead of speaking of the increased contractility of arteries, we shall be perfectly right in saying increased tonicity of those vessels. We say irritability is heightened by heat and diminished by cold, and tonicity decreased by heat and increased by cold, and so on.

With a view to avoid this confusion and render our ideas of disease as simple and definite as possible, we recommend

the following distinctions to be observed between these terms.

Irritability is that property of organs and tissues which they enjoy in virtue of their connection with the nervous system, and by which they sympathise with each other in health and disease. It cannot be recognised independently of the nerves; and parts which are irritable are necessarily endowed with sensation. Thus we have irritable eyes, mammae, testicles, &c. It may be described as a low form of sensibility, which in a higher degree causes pain. In its natural state it forms an essential element of our health, for it is through the previous exercise of this property that all the involuntary and organic motions are ordinarily executed. For instance, how does the alimentary canal usually contract? Does not an impression of some kind, that is, excitation of this faculty precede each act of intestinal contraction? When irritability or organic sensibility is morbidly acted upon, it produces irritation, which is a kind of sensation, just as contractility when exercised causes contraction or spasm.

Tonicity, on the other hand, is a compound property, indicating the sense of health or tone enjoyed by a part or parts, in which several structures are necessarily concerned, as when we say tonicity or tone of the intestines, tone of the arteries, tone of the body, &c. Here we not only allude to the state of the nerves or muscles, but of several other constituents also, of which the part or the body is made up. Contractility again is the characteristic faculty of the muscular fibre or substance. These distinctions would be of infinite importance for practical purposes.

If we carelessly use the word tonicity for contractility, as we do in the case of the arteries, what wonder can there be if some students in the progress of time confound the one property with the other? and others more discerning, who perhaps see some faint difference, frequently come to us to ask for the real distinction between the use of those two terms. Would any teacher of medicine consider himself to have sufficiently done his duty by merely suggesting that

irritability and tonicity are other names of contractility, or by pointing out such slight differences as heat increases irritability and decreases tonicity, and cold *vice versa*, &c.? Would it not be better if he could save himself the trouble of such vexatious explanations altogether, by at once pulling up the evil by its root? To say irritability is contractility, and contractility is tonicity is like heaping confusion upon mystery.

Having settled the question of the muscularity of arteries, we shall now consider how their contractions become excessive, defective, and perverted.

As the muscular fibres in arteries are disposed in one direction, viz., spirally round their canals, there can be but one contraction, that is, the concentric or vermicular, which is naturally *coeristent*. It is a slow, gradual, and continuous contraction, without relaxation, its constancy being attributable to the incessant motion of blood and the coexistence of spasm in the arterial canal. It may be supposed to be excessive in three ways, viz. :

First. *By uniform addition to the resident muscular sense.*

Secondly. *By uniform reflection of the resident sense; and*

Thirdly. *By partial intensity of the same.*

An instance of the first is to be found in the state of circulation in stethnic plethora, characterised by the full, bounding, tight, hard pulse. The contractile power is here actually increased by over nutrition many times beyond its natural quantity. When the increase is moderate, there is vigorous and active circulation, the heart acting with unusual force and freedom; but when it is excessive, so that the capillaries are disposed to be narrower than usual, the circulation would be greatly impeded, and the heart oppressed by its own load. Fortunately, in the latter case relief is usually at hand, either by loss of blood, natural, or artificial (hæmorrhage and bleeding by the lancet) or dilatation of some vessels by relaxation (determination, inflammation, &c.).

The second variety of excessive contractility is met with in cases of sudden loss of blood, in the cold stage of ague, and

where an artery is suddenly emptied of its contents. In these the excess may be said to be owing to the sudden diminution of the diameter of the column of blood, so that a much smaller quantity of the resident sense is required to contract upon it than is actually present in the vessel, the remainder being, as it were, reflected on the already contracted artery, makes its contraction unusually tight. Hence perhaps the reason of the narrow, contracted, and wiry pulse in such cases.

The third kind of contractile sense occurs in the first stage of inflammation and determination, as when an irritant is applied to the web of a frog's foot under a microscope, and the arteries at first shorten their calibre at the point of irritation. The contraction is here excessive from partial intensity, or rather unusual excitation of the inherent muscular sense, the canal behind and beyond it remaining evenly contracted.

In connection with this account of the excessive muscular sense of arteries, we think it would not be uninteresting to take a brief survey of the nature of inflammation.



## A FEW GENERAL OBSERVATIONS ON THE NATURE OF INFLAMMATION.

IN the whole range of the medical science there is perhaps no subject which draws so largely the attention of medical men, and on which such strange opinions and extravagant and hideous doctrines have so lavishly been expended, as the nature of inflammation. Some attribute its phenomena to spasm of the capillaries, some to their dilatation, and some again stray still further in the field of imagination, and deduce inflammation from certain attractions and repulsions supposed to be inherent in the living tissues and organs. Others define it to be too much blood in a part, with motion of the blood partly increased and partly decreased.

There is no doubt that an essential part of the inflammatory process is the more or less slowness (to which we add difficulty) in the motion of blood in one part, and an inordinate freedom of the circulation in another part, in the seat of inflammation; the former often amounts to its complete suspension. But the question is, what produces this slowness of motion in one part and its freedom in the parts surrounding. The state of the vessels in which these phenomena occur, as far as the subject has yet been investigated, would appear to be one of dilatation and enlargement; those centrally situated, and with a retarded or obstructed current, being the longest relaxed, and serving apparently by their progressive blocking up as a cause of further dilatation of the channels contiguous to them. By a simple enlargement of calibre we can easily understand how the rapidity of an originally narrow current is necessarily reduced, and is succeeded by a slower movement, and also how the same current would be inordinately free if it occurs in consequence of obstruction in a neighbouring vessel. But how is dilatation or relaxation originally given rise to?

In our opinion the dilatation or relaxation of capillaries which constitute inflammation is always, or in a majority of



cases, brought on in the first instance by spasm of those vessels, generally of the third variety, that is, *spasm of partial intensity*, and that the same is afterwards kept up, as we have already said, by an impervious or blocked up condition of some of them, viz., those longest relaxed, induced by the adherence of large numbers of lymph corpuscles, and also by coagulation of blood in them.

We go further, and maintain that spasm sometimes abides in some capillaries of the affected part with substantial obstruction in dilated vessels, as a permanent cause of inflammation, in many instances, throughout the course of that disease.

Those who judge of the whole of the inflammatory process from what they see in the transparent structures of animals artificially excited to simulate that condition, will perhaps object to our statement that inflammation almost invariably commences with spasm in the capillaries, and that the obstruction in that disease when confirmed is always the effect, directly or indirectly, of such spasms. For they may urge that dilatation is seen frequently to occur without any visible previous contraction. But we believe that there are many fallacies to which we are liable in instituting these experiments in the ordinary way, and unless we are careful in attending to them our conclusions must be more or less vitiated.

For instance, in making these experiments, say on the frog, which is usually selected as the subject of such examinations, the way in which we handle and prepare the animal for the stage of the microscope, and the mortal fright into which we put it during these operations, are such that it would be impossible to avoid errors in our observations unless allowance be made for these interfering circumstances. We believe the frog's foot thus inspected will present the capillaries in a state of more or less spasm of a longer or shorter duration before being subjected to any stimulant application, from causes just alluded to, so that it will be quite possible to see some vessels dilate without any apparent contraction

at all, and others contract still further, and then suddenly relax under a potent stimulus, all depending, in short, on how long and to what extent these vessels were previously excited before being seen.

Again, in making these examinations, with all the shifting and change of posture of the object viewed, we can only bring a certain portion of the web under the eye at each sitting or inspection, consequently we are obliged to remain in ignorance of the state of the parts surrounding or lying on one side or other of what is presented; and who can tell how far these unknown conditions in the neighbourhood, or at a little distance, may have influenced the appearance of the part under inspection? for we know circulation may be disturbed at some distance from the seat of spasm, as in rheumatism. We can point out other sources of error, but these will suffice to show that the ordinary arguments against the pre-existence of spasm in every case of dilatation are wrong. The following appears to us to be the true order or sequence of phenomena in the first stage of inflammation:—

1st. *An exciting cause, capable of inducing augmented capillary action.*

2nd. *Contraction and narrowing of all the capillaries subjected to excitement with increased frequency of their currents.*

3rd. *Great resistance to the motion of the blood in proportion to the narrowing of the affected capillaries, and hence a tendency to flow into other channels unaffected with spasm.*

Although the increased quickness of flow in contracted vessels does to a great extent compensate for its diminished size, yet we are perfectly convinced that the whole of the natural quantity of blood does not pass through the narrow tubes however their currents may be accelerated, and that a portion in every such case is diverted into the adjoining channels by an extro-pulsive effort, which will amount to the degree of resistance met with. It is not improbable that capillary spasm is sometimes so excessive as altogether to suspend the current, and thus lead to direct and forcible dilatation of neighbouring vessels. Even when of less force, but of great extent, it gives

rise to the same result as we see in the shivering fit of ague, in which the vessels in the internal organs are distended in consequence of spasm of the surface.

4th. *Relaxation of vessels hitherto in contraction.*—1st. Of those longest contracted, generally in the centre, or those loosely situated. 2nd. Of the remaining, either through their entire lengths at once, which renders the motion of blood easy for a time, or interruptedly here and there along their course, so that while one portion is dilated another is still partially contracted, thereby causing an oscillation of the current.

5th. *Blocking up of the relaxed tubes with lymph corpuscles (leucocytes) and agglutinated blood, and therefore total cessation of all motion of their currents.*

6th. *Enlargement of the surrounding vessels as a consequence of the obstruction in the central capillaries.*

The dilatation of the neighbouring contiguous vessels and the free motion of a large quantity of blood through them, therefore, are always after events induced by and succeeding excessive contraction of the central capillaries, or some cause of obstruction in them (in the later stages of inflammation it may be coagulated blood inside them, or effused lymph, or some foreign body, &c., pressing upon their sides). We do not believe that the *vis-a-tergo* alone can effect distention or relaxation of arteries without the necessary previous concurrence of some obstruction (generally in shape of spasm in the first instance) in the neighbouring capillaries. Let the heart beat with as much violence as it can, still it will not succeed in engendering the elements of inflammation so long as there is concurrent and even contraction throughout the whole course of the arterial and capillary channels. The advocates of the theory of dilatation argue from a distant point of the process of inflammation, and not from its starting stage, the obstruction to the flow of blood in some part, in consequence, generally, of spasm in the capillaries. They do not trouble themselves to inquire how the dilatation is so easily produced, and how it is afterwards kept up.

In the incipient or first stage of inflammation, when no

relaxation has taken place, and no lymph globules could be observed in the liquor sanguinis, either to pass on or adhere to the walls of the capillaries, the chief cause of obstruction or resistance to the onward motion of blood is undoubtedly the contraction of those vessels. If the capillary spasm be removed in time by the usual means, the inflammation would necessarily terminate in resolution, but the spasm, or some cause of obstruction, may be renewed at the same part, or at a greater or less distance from it, and the same mild inflammation would be reinduced, that is, an inflammation without remarkable products. As an instance of a mild inflammation returning in the same part we may point out local rheumatism and gout, in which a patient suffering from excruciating pain in a joint with some swelling and redness for a whole night, feels suddenly quite relieved in the morning, and then has a return of the disease again at night. The same inflammation attacking different parts in succession is seen in general rheumatism and gout, in which the wandering pain leaves one part to appear the more surely in another; in erysipelas and other similar diseases.

In order that a disease may be able to change its seat from one place to another, or extend its sphere of action continuously, it is necessary that the following conditions should be present:—

First. *With regard to the disease itself, that it should be of a mild, superficial character, and the less encumbered with products the better, so that it may be the more easy of carriage.*

Secondly. *That there should be a continuity or contiguity of structure; and*

Thirdly, or lastly. *That there should be a general resemblance of structure and function of one part to those of another, so as to create a direct sympathy.*

It is wrong to say that gout, rheumatism, erysipelas, &c., are essentially different in their nature from common inflammation. No two cases of inflammation could be pointed out which do not agree with each other in their chief primary

elements; the same unusual contraction of the vessels in one part, and their dilatation in the contiguous or surrounding parts, are to be found in them all. If they differ, it is subsequently, by their intensity and products, which are modified by various circumstances, such as the seat of the disease, its cause, the structure it affects, the constitution of the patient, or blood, &c. The obstruction to the onward course of the blood then, being almost invariably antecedent to the consequent excessive freedom of circulation in the neighbouring vessels, and therefore one of the earliest and chief elements of inflammation, and as the cause of this obstruction is generally spasm of minute capillaries, it may be advantageous to divide inflammation into three kinds, according to the nature of the accompanying spasm, viz., the *current*, the *recurrent*, and the *concurrent*. By *current spasm or cause of obstruction*, we mean the spasm (or cause of obstruction) going on in a part without extension or subsidence, so as to cause the inflammatory process (or rather the dilatation of the surrounding vessels, with or without result), to be necessarily limited and circumscribed. On the other hand, by the *recurrent* we allude to the spasm (or cause of obstruction) which recurs or returns either in the same part or in some other parts; in either case a former inflammation is to be supposed to have undergone partial or complete resolution. And lastly, by the *concurrent*, we understand that spasm (or cause of obstruction), which is a combination of both the current and recurrent; in this the original inflammation is being constantly added to and extended.

Let not our readers fall into the dangerous mistake of supposing that since we have proposed a threefold division of inflammation on the character of spasm, or cause of obstruction present in each, we naturally overlook the other most important element of inflammation, viz., the dilatation of vessels which succeeds and accompanies that obstructed condition of the capillaries. Dilatation of vessels is originally intended by nature as a mode of relief to the circulation, oppressed in consequence of capillary spasm or obstruction.



To a certain extent it must be considered as such, but beyond that it becomes a fruitful cause of mischief. Thus, when from excessive contraction of the capillaries the current of blood is impeded or intercepted, so that a portion of blood, or the whole of it, that was to be transmitted through them, must necessarily be retained in and react on the arterial tubes above and around them, if these over-filled vessels now did not yield to the *vis-a-tergo* and relax, one of two things would, as a matter of course, follow, viz., either the contracted capillaries would burst, giving rise to hæmorrhage, or the part would die of extreme compression or pressure. Indeed, death of the inflamed part under these circumstances would be inevitable, however mild the inflammation might be, and is not an unfrequent event in the wards of our best conducted hospitals. What surgeon is not aware of the danger of gangrene in the inflammation of the compressed limbs, and its frequency in deep-seated parts?

What is the history of gangrena senilis? Is it not deficient *vis-a-tergo* failing to dilate the vessels sufficiently? Is not a tonic regimen and warmth to the parts attacked, to assist and increase the power of the heart, in order to relax the vessels around the seat of spasm, or obstruction, the chief and proper indication of treatment? What produces the extensive sloughs of burns and confluent small-pox? Do we not often augment inflammation by the too quick application of cold to the dilating vessels, thereby interfering with the kind intentions of nature? The maintenance of a certain degree of *vis-a-tergo* and some amount of dilatation is, therefore, in many cases the only means of cure of an inflammation.

The dilatationists take a one-sided view of the process of inflammation, in not only overlooking its cause, but also in confounding the latter among its general phenomena. One of their most favourite arguments, which they think to be incontrovertible, and consequently the bone and sinew of their exclusive theory, is that such medicines as digitalis cure inflammation by reducing the *vis-a-tergo* by their direct

sedative influence on the heart, and thereby lessening dilatation of vessels as a matter of course.

We are far from disputing with them the fact that the heart's action is lowered by digitalis, and that the vessels relaxed may thereby to a certain extent get back to their former tone; but what we now ask is, if they have not begun their explanation at the wrong end?

They have told us that the action of digitalis is to lessen the tumultuous motions of the heart alone. We are under deep obligation to them for this valuable piece of information, viz., that the heart is acted upon by digitalis as a powerful sedative. But will they allow us to put a few cross-questions, which the knowledge they have themselves imparted naturally suggests? Why should the digitalis be thought to confine its action to the heart alone and not extend to the whole vascular system? Is there no other part of the vascular apparatus which is as contractile as the heart, and which is as much in the way of digitalis? Does the sedative medicine exercise any partiality, and by choice reside in the chambers of the heart to sooth and quiet its violence, or does it circulate through the whole system? Are all the effects of the drug produced by its short limited transit through the heart, or from its universally diffused impression on the capillaries also? We shall not pause for a reply; it will be in our favour which the dilatationists cannot contradict, for we have given fair play to their therapeutical knowledge.

The action of digitalis as a sedative is undoubtedly extended over the whole lining of the vascular system, especially the capillaries, which, being soothed and freed from spasm, allow the blood to again flow smoothly through their hitherto more or less obstructed channels, and the surrounding vessels, being at the same time relieved of their overflow, gradually return to their natural tension. The circulation being thus restored to its usual calm and ease, there can be no longer any need for the heart to beat with increased force, hence the slowness of the heart's action under digitalis. This, in our

opinion, is the true explanation of the beneficial effects of digitalis in inflammatory diseases.

We shall now cite a few examples of inflammation arising from each of the three great varieties of spasm, or cause of obstruction, viz., the *current*, *recurrent*, and *concurrent*, to which allusion has been already made, and which we have adopted as the basis of our classification of that most diversified and varying disease.

Those proceeding from the *current spasm* or *cause of obstruction* are such as the inflammation of the viscera and of deep-seated parts, and generally those from accidents; also the scrofulous and phlegmonous inflammations. They are characterized by the continuance of the spasm or cause of obstruction at the same part without addition or subsidence; by their being generally circumscribed and deep-seated, involving several structures; by their tendency to extensive disorganization; by their greater duration and productiveness, if not speedily resolved; and lastly, by their attacking parts more from contiguity than from continuity of structure. These inflammations resemble the continued fevers.

As examples of the disease arising from *recurrent spasm* or *cause of obstruction*, we may point out all the wandering and intermittent inflammations which visit the same parts or distant parts in quick or retarded succession, as gout, rheumatism, some cases of erysipelas, &c. In all these the spasm has a remarkable tendency to return; thus in gout and rheumatism, after a joint has suffered from heat, swelling, pain, &c., for some time, it is not uncommon to find it suddenly relieved of those symptoms; then comes on another fit, perhaps of greater severity, in the former joint or a distant one, or a great many of them at the same time, and then a third attack, and so on, till either the disease is subdued by the patient, or the patient by the disease. They are distinguished thus: firstly, by the general mildness of their attack, and consequently they are less loaded with products, unless, as occasionally happens, they become intense and protracted. This mildness arises from the mildness of their spasm, which is easily re-

moved by pressure, friction, warmth of the sun, &c., and increased by cold; secondly, by their preference for particular structures, as erysipelas for the skin, rheumatism for joints and muscles, &c. On account of this partiality, their products vary more or less from those of ordinary inflammation. Owing to the low vitality of parts composing our joints, a gritty matter is secreted in gout, and there is seldom any pus in rheumatism. When rheumatism, however, affects the heart and pericardium, the result is reversed, for very obvious reasons. Thirdly, by their extending and recurring more by the similarity and continuity of structure than by its contiguity; and, fourthly or lastly, by their proneness to become chronic and habitual. They may be compared with the intermittent fevers in the fever series.

The third variety of inflammation, or that arising from *concurrent spasm*, is represented by what we call the spreading or membranous inflammations affecting the mucous, serous, and cutaneous membranes. In these, *to the existing current* are successively added other new spasms or causes of obstruction, so that the inflammation spreads, as it were, from a centre to the circumference. In this way new points of disease go on, to be continually joined to those previously existing, until, it may be, the whole membrane is involved.

They may be sub-divided into those of shut sac cavities, and those of membranes having an outlet, as in peritonitis and in mucous enteritis. They are generally known—firstly, by their increasing continuance; secondly, the greater quantity of their products; thirdly, these products being more fluid than solid; fourthly, by the greater power they have of relieving themselves by effusions, owing to their peculiar positions; and fifthly, by their greater mortality. In their treatment a prompt and more vigorous action is called for in consequence of the *concurrency of spasm*. We have here to deal not only with the current spasm, but also with those which are being constantly superadded. These inflammations are analogues of the remittent fevers.

## CHAPTER XI.

DEFECTIVE AND PERVERTED MUSCULAR SENSE  
OF ARTERIES AND CAPILLARIES.

THE arteries and capillaries, like all the muscular tubes, are subject to a loss of their contractility, and instead of maintaining a tight, even pressure, as usual, on the moving column of blood by their slow incessant contraction, they yield to every dilating effort of the heart. This, in short, is the state of vessels in congestion and determination. There are various ways in which the defective muscular sense is induced, but the following are the most common:—

*Firstly.—By heat.* It is not easy to explain the operation of this agent on living contractile matter, but the fact that it reduces contractility none will ever question; perhaps it interferes with due nutrition by its extraordinary tendency to physical changes, and destruction when beyond a certain quantity.

*Secondly.—By withdrawal of the protective influence of the nervous system.* Although contractility is an independent property of muscle, yet in a complex organization like ours, it is subject to the nervous system for its due regulation. Its supply is due to proper nutrition, and not to direct nervous influence; but the nerves have still a power of direction and supervision over it; there is a certain harmony between the muscles and the nerves, which, when disturbed, must leave the former to act without any control, so that in a vascular plexus thus situated, there may be some vessels unusually contracted, while others remain of their natural calibre, and will become dilated if the contractions do not soon yield.

*Thirdly.—By sedative impressions,* which must be supposed to act equally on the contractile sense and nerves.

*Fourthly.—By imperfect supply of blood or its poverty,* as in anæmia.



*Fifthly.*—By *previous excitation*, and thus *producing exhaustion*. Within this head we might include venous obstruction.

*Sixthly.*—By *spasm*, or *some cause of obstruction in the vessels in the immediate vicinity of those manifesting defective muscular sense*. Some vessels affected with spasm producing obstruction of their own currents, however slight, will necessarily cause others to receive more blood than is their natural share, and the heart, aided by this partial resistance to the circulation, and the distending effects of an excessive amount of blood above the seat of spasm, soon overcomes the natural contractility of collateral channels. This last, in our opinion, is the most frequent source of congestion and determination.

By congestion we mean an increased quantity of blood in a part, with diminution of the motion of that blood. Determination is the same with natural, or as often is the case, with exaggerated *vis-a-tergo*. Congestion may be venous as well as arterial; determination is only confined to arteries and capillaries. In congestion, there is, perhaps, little or no change in the pulse; in determination, the pulse is generally unusually full, bounding, and hard. They both arise from the same cause, *viz.*, spasm; and the same spasm which induces inflammation will give rise to congestion and determination. Inflammation, congestion, and determination not only originate from the same source, but agree with each other in having the same condition of vessels, *viz.*, that of their dilatation. Again, congestion is easily convertible into determination and inflammation, and determination into congestion and inflammation. It is entirely the action of the heart, or the slowness or freedom of circulation in the affected parts which determines which of these processes it is to be. Let the heart act slowly on the relaxed and dilated vessels so that their currents may be tardier than usual, and it would be congestion; let it act with more force and let the current be more free, and we shall have determination or inflammation. More properly speaking, therefore, these three terms are expressive of one and the same affection, with greater or

less *vis-a-tergo*. The word congestion is useful as indicating the slowness of the heart's action, or rather of circulation (the heart's action being even) in the congested part. But what is the good of employing two names, determination and inflammation for the same vascular phenomena, viz., the dilatation of vessels with increased action of the heart; for these two elements are comprised in both these expressions. To prevent misconception, we ought here to state that we do not mean that in every case of inflammation or determination there is necessarily an increase of the heart's action. When those processes are of some extent, such is no doubt the case, but what we mean is, that in those diseased states of vessels the circulation is always carried on freely and unimpeded, either throughout or in part, the heart acting with its natural or exalted power. In congestion, the heart action is not only generally defective, but the motion in the diseased part is either suspended or unusually slow. Is there anything more in inflammation which is not observable in determination? It may be said that inflammation differs from determination in its peculiar products (effusion of liquor sanguinis, pus, &c.) and in its terminations. But some inflammations have no products. Why are these inflammations not called determinations, both being formed of the same elements, viz., dilatation of vessels and excessive *vis-a-tergo*? Here they arise from the same cause, consist of the identical states of vessels and symptoms, and both terminate in resolution. Is there not here evidently a superfluity of language and a source of much after confusion? We believe that the so-called inflammation, as a separate disease, has no existence in nature, and that it is nothing more nor less than an advanced stage or form of either congestion or determination.

All the phenomena of inflammation are explicable by those of determination and congestion, as we shall now endeavour to show.

We judge of congestion and determination by their symptoms and products; the latter are such as the effusion of blood, as in idiopathic hæmorrhage, of serum as in dropsy, of

liquor sanguinis as in the so-called inflammation, &c. In order to understand clearly how these effusions take place through the coats of vessels, it is necessary that we should first enquire into those circumstances which favour or oppose transmission of fluids through living membranes, or tubes generally, and then see how far these circumstances obtain in the condition of vessels in determination and congestion.

The following conditions may be enumerated as favouring permeation :—

*First. That the fluid should be as thin, pliable, and exudable as possible.* We know blood possesses these properties in an eminent degree, as we see in idiopathic hæmorrhage in which that fluid passes bodily through the capillary structure without the least apparent rupture of continuity. The same is also observed in the distillation of its serum in dropsy, and of liquor sanguinis in phthisis and ordinary nutrition.

*Secondly. That there should be some pressure or injecting force exerted on the fluid column.* The impulse of the heart and the weight of the superincumbent blood on the seat of determination and congestion supply this condition, which will therefore be more effective in proportion to the increase of the *vis-a-tergo*, and the greater resistance the heart has to overcome.

*Thirdly. That the column of the fluid must be in motion.* This condition is at least necessary to blood, for this fluid when not moving has a tendency to separate into fibrine and serum, as seen in coagulation of blood in vessels cut off from the general circulation. The freer the motion, the richer the blood, the more abundant and plastic would be the exudation. Wine and other substances increase secretion by perhaps partly exciting too much contraction of capillaries (short of disease) in some parts, and thereby dilating them in other parts of an organ, and partly by increasing the *vis-a-tergo*.

*Fourthly. That the fluid should have some warmth.* This is essentially requisite as regards the blood, and the liquor sanguinis.

*Fifthly. That the tissue through which a fluid has to make its way should be as permeable as possible.* Permeability being a physical property, is increased in proportion as the tissues are softened and relaxed, which would be the case with the vessels when they are dilated by more or less defect of their resident muscular power. Had it not been for the controlling influence of vitality on the imbibing property of soft organic textures, the fluids of our body would soon diffuse through each other, its cavities would fill up with dropsies, and its canals would be inundated with fluids of various kinds.

Let us now ask if these several conditions do, or do not exist in the seat of determination and congestion? Certainly and most unquestionably they do. What is to prevent the vessels in determination and congestion throwing out blood, serum, pus, &c., as well as liquor sanguinis through their coats? They are relaxed and more permeable than in health, and the blood is warmer, and moving, and quite transmissible. Why then should there be no effusion, when everything concurs to favour that process? And suppose a little liquor sanguinis (coagulable lymph) exuded from the dilated vessels of determination and congestion, as it is daily doing, ought we for that reason to say that it is no longer either congestion or determination, but a different disease altogether, called inflammation? When a melon instead of a stone falls from a height on the ground, is it true that it is no longer through gravitation? When an ague excites some visceral complication, does the ague receive a new name? Why should we then maintain an absurd distinction with regard to certain results of congestion and determination? Is it because by their very constitution they sometimes allow transudation of liquor sanguinis or lymph, that we must, therefore, create a new disease? We do not make a new name and new disease when from a similar state of vessels there is effusion of serum and blood. There are certainly two words, dropsy and hæmorrhage, but these two terms we know do not express two actual separate diseases; they are used to indicate two prominent consequences of congestion and determination,

and not to represent two new conditions of vessels. In the case of the expression, *inflammation* however, it actually recognizes a new disease, of which there is no real existence. If by it we meant effusion of liquor sanguinis, as by dropsy and hæmorrhage we understand effusions of serum and blood (all results of congestion and determination), we should have no objection to using it as a convenient minor medical term. But when it pretends to keep in shade and almost to supersede the two most important and universal forms of disease (congestion and determination) by a sort of borrowed plumage distinction, that it differs from all other diseases by its peculiar products, that is, effusion of liquor sanguinis, and its after changes, as into pus, gangrene, &c., it is high time for us to discard for ever this meaningless impostor of a name, which has deluded mankind from the very cradle of medicine. The effusion of lymph, suppuration, mortification, ulceration, &c., are invariably the results of either congestion or determination, but not of inflammation, which exists nowhere in nature. It is simply a bugbear in medicine, the hobby of medical writers, and a phantom in science. The term inflammation, if it be still retained in the medical language, should not have more value than we attach to dropsy and hæmorrhage.

Inflammation, being thus banished from the rank of pathology, and we hope the profession will acquiesce in such a reasonable verdict for the sake of our noble science, it would now be necessary to suggest some alterations in nomenclature, in order that that vast class of affections which hitherto bore the imposing title of that illusion, may be brought under the respective banners of determination and congestion.

We propose to divide congestion and determination respectively into simple and productive. Simple congestion and determination are those in which, although there is a tendency to production, they are still free from that process. They admit of no further sub-division, excepting that they may be *current*, *recurrent*, and *concurrent*, according to the character of spasm, or cause of obstruction, from which they arise. Productive congestion as well as determination, however, besides



being *current*, *recurrent*, and *concurrent*, may be sub-divided into five varieties, according to the nature of the effusion, viz., *blood*, *serum*, *mucus*, *synovia*, and *liquor sanguinis* or lymph; these may be respectively called *sanguineous*, *serous*, *mucous*, *synovial*, and *albuminous productive determinations* and *congestions*.

Examples of productive congestion and determination causing loss of blood are passive and active hæmorrhages; producing discharge of serum, passive and active dropsy; of mucous, chronic and acute diarrhœa, dysentery, and bronchitis; of synovial secretion, as chronic and acute arthritis, with effusion of synovia; and lastly, producing albuminous or fibrinous discharge, as chronic and acute inflammations of organs, albuminuria, acute peritonitis, &c. In short, the chronic inflammations giving rise to aplastic and eaeoplastic lymph would range themselves under productive congestion; in like manner those producing euplastic lymph would come under productive determination.

It must, therefore, be evident that all the chronic, passive, and sub-acute inflammations, whether the product be blood, serum, mucus, synovia, or liquor sanguinis, are synonymous with productive congestion, and the acute inflammations with productive determination.

As we shall henceforward be using these new names to indicate old inflammations, we beg to request our readers who intend to follow us through the remainder of our course to attend carefully to the change of terms we have here substituted.

Sufficient evidence of the nonentity of inflammation as a distinct disease may be derived from a consideration of the progress of determination and congestion, and of the manner in which they become productive.

When the capillary obstruction has existed a longer or shorter time, the parts around them swell up, partly from the increased magnitude of the vessels of determination or congestion, and partly from effusion of lymph and serum, that is, liquor sanguinis, from their sides. The swelling is accom-

panied with increased throbbing, which we cannot attribute to the contracted or obstructed capillaries, with little or no motion of blood in them, nor to any other source. In the same manner we cannot refer the attendant pain to those narrowed or blocked up vessels, but to the distension of nerves by the sudden swell of determination or congestion. The heat and redness must arise from the *same cause*, that is, from the dilated vessels with too much blood in them in free motion, the general cause of colour and temperature. All these immediate effects of inflammation, therefore, can be traced to determination and congestion.

Let us now see whether the subsequent events would not afford further confirmation to the opinion we have advanced, that there is no inflammation in nature.

The consequences of inflammation, as they are commonly called, are effusions of lymph and serum, formation of pus and gangrene. We shall first of all see if the liquor sanguinis usually exudes in determination. For this purpose we shall adduce one case which will not only prove that capillary spasm is generally the cause of determination, but also that determination is necessary to throwing out of coagulable lymph. What are the phenomena that usually attend the healing of wounds by the first intention, as it is called? For instance, when a stump is closed after amputation, or an incised cut wound is cleaned, apposed, and plastered up; what is the first thing we observe to take place? This is certainly the retraction and contraction of the cut ends of the capillaries and minute arteries, which is followed by determination, that is, dilatation and greater fulness of blood in the vessels untouched by the knife.

The determination being a relieving process, terminates in effusion of liquor sanguinis into the cavity of the wound, and the cut extremities of capillaries being by the same act freed from their spasm, grow out into the coagulated lymph now thrown out, which is thereby organized, and the wound healed up.\*

\* N.B. There is reason to think that in secondary organization following

Is not here the spasm the immediate cause of determination, determination that of effusion of liquor sanguinis, effusion of liquor sanguinis that of relief to the contracted capillaries, and lastly, the relief of the cut ends of those vessels, that of organization of the lymph, and the consequent union by the first intention. Do these several changes follow in any other order? If the contraction of the capillaries did not take place in the first instance, and it is well known these vessels have very little retraction, the result would undoubtedly have been incessant hæmorrhage and unavoidable death. Wherefore, we conclude that spasm, or some interruption to the course of blood, is essential to determination, and determination to effusion of lymph. How is a foreign body retained embedded in the living body without harm or inconvenience to the individual? Is not the false membrane here produced by an analogous process? Does it not appear probable that the wounded capillaries around the foreign body are either plugged up or excited into spasm, giving rise to determination in others that have escaped injury, which determination resolves itself, by effusion of liquor sanguinis, which, becoming hardened and semi-organized, protects the surrounding soft parts from further mischief by the extraneous object being thus securely enclosed. Again, in what are called the circumscribed inflammations, where is the protecting layer of lymph usually thrown out? Is it not where there is the greatest dilatation of vessels, with free motion of blood in them at the circumference of the disease, that is, where there is, properly speaking, productive determination?

What is here stated with regard to determination will equally hold good with regard to congestion, which is not unfrequently a fruitful source of morbidly-secreted liquor sanguinis, as in phthisis and scrofula. What practitioner of any experience has not noticed a marked accession to the effusion of lymph, vessels are formed by a peculiar channeling in the blastema without any aid from those of old structures; an intimate anastomosis takes place subsequently between them, but it is not known how this is brought about; capillaries have, however, still a power to elongate and grow out by an inherent force of their own.

tubercular disease by every fresh congestion in the lungs? Who that has watched with care the progress of scrofula, the affection of lymphatic glands, for instance, in a patient tainted with that malady, has failed to attribute the morbid phenomena to a slow, lingering inflammation, or dilatation of vessels with motion of blood slower than in determination, and with products? In the same scrofulous subject, when the capillaries are similarly affected, but the motion of the blood is active and free, we may have determination with more plastic product or lymph.

The effusion of liquor sanguinis which we have thus traced to congestion and determination usually takes place in three situations, viz., surfaces of membranes having an outlet, shut sac cavities, and the substance of organs. The first is exemplified in the secretion of euplastic, cacoplastic, and aplastic lymph from the surfaces of alimentary, genito-urinary, and pulmonary-mucous membranes; second, in the distillation of liquor sanguinis into the pleural, peritoneal, and arachnoid cavities, &c.; and the third, in the deposition and extravasation of the same substance in the parenchyma of viscera and organs, as in Bright's kidneys, nutmeg liver, tubercles in the lungs, &c. These observations will also apply to the other two important effusions of congestion and determination, viz., blood and serum, which take the same three seats in the course of their elimination.

The character of the liquor sanguinis will vary as to its plasticity, according as it is the effect of determination or congestion. In determination, the blood being good and its motion little impaired, the resulting lymph would be necessarily euplastic, capable of being easily recalled to life by vascular distribution. This is the way that adhesions are formed, ulcers healed, and limbs preserved from further destruction in mortification. Where, however, effusions proceed from a state of vessels bordering on determination, the plasma thrown out is of a more or less degraded character, and cannot be easily brought back to life. This is the case in the commencement of most cases of Bright's disease,

nutmeg liver, and tuberculous phthisis. And lastly, when the lymph is the product of congestion, it is usually aplastic, and perfectly useless, hence it tends to the secretion or formation of pus, ichorous discharges, &c.

*Suppuration as the Result of Determination and Congestion.*

We can no longer dispute the fact of the great facility with which vessels in a state of determination and congestion allow fluids, such as blood, serum, and liquor sanguinis, to pass through their coats or substance without rupture. The same may be said with regard to pus, which in most cases appears in the character of a transudation or secretion, as the pus in gonorrhœa, ophthalmia, &c. But what is suppuration? Is it traceable to determination and congestion? In our opinion, it is entirely a chemical process, the decomposition into a thin, permeating material, of coagulated blood or lymph in a part surrounded with determination or congestion. It can take place either within the capillaries, or outside those vessels, in the midst of several structures, where lymph or blood has been extravasated. It is a change which can only occur in the living body under certain conditions which that body supplies. Perhaps a certain increase of animal heat and some weakness and want of tone in the part surrounding the dead effused blood or lymph, are essential to suppuration, for it is well known that pus is formed faster, richer, and in larger quantity near determination than congestion, as may be seen in a common abscess, compared to one having a scrofulous origin. In the latter, the formation of pus is not only slow and scanty, but it is imperfectly made, as if the heat of congestion which favours its production was not enough.

Purulent matter formed external to vessels is observed in the following cases: softening of tubercles in pulmonary phthisis, suppuration in the hepatized lungs, the greater part of the pus in peritonitis, empyæmia and pericarditis, and the generality of abscesses. The same, made within vessels, is



seen in gonorrhœa, ophthalmia, otorrhœa, pus in vessels in which any putrid substance has been introduced causing coagulation and liquefaction of blood, pyæmia, &c. To understand clearly how pus is produced inside vessels, it would be necessary to notice the alterations the blood undergoes in its passage through dilated vessels in the progress of determination and congestion (productive). One most important of these changes which we need only mention here, (besides the increased coherency of the red corpuscles so that they easily run into rolls,) is the tendency of the liquor sanguinis to become more and more adhesive, and to break up into solid particles of lymph of various shapes generally larger than the red corpuscles (lymph globules, leucocytes, &c.). These bodies have been observed to increase in number in vessels longest dilated, and at last to stick to their sides in such numbers as to totally obstruct them, thus serving as a further cause of the current determination and congestion. It is these lymph corpuscles, which must at first render the circulation more and more difficult in the centrally relaxed capillaries originally affected with spasm, that led an eminent authority to define inflammation to be, "too much blood in a part, with motion of that blood partly increased and partly decreased." But this diminished motion in the centrally relaxed vessels which, although by its gradual obstructive effect keeps up the so-called inflammation, by giving occasion to dilate other vessels previously uninvolved, by the general law we have laid down before, viz., the more obstruction the more dilatation, always occurs after some capillary spasm, which is the original cause of all determinations and congestions, and therefore of the mis-called inflammation, and which spasm often accompanies that disease through a great part of its course. These central capillaries, which first give rise to determination and congestion in their neighbourhood by intense spasm, if not speedily relieved of this state, become also dilated by relaxation, and blocked up by the same adhesive lymph. To be more explicit, we should here observe that spasm of capillaries, which is the usual

antecedent to dilatation or rather relaxation of those vessels in the process of inflammation, is, in most instances, an abiding phenomenon, that is, it does not cease the moment the relaxation of a few vessels takes place by exhaustion or direct distension, but it continues for a longer or shorter time after that event, provided the disease be progressive; creeping on, perhaps, from one channel to another as its contractility is expended by time, and consequently in all such cases a few vessels still go on dilating which are seated internal to those that had first or previously undergone that change; the difference between these two sets of dilated vessels being that the latest relaxed tubes become choked up at once in consequence of their immediate vicinity to the part longest involved in disease, owing to their centric position and the total loss of their vital contractility which must follow protracted contraction.

In the suppurative stage of determination and congestion, then, we must recognise three varieties of dilated vessels. First, *those in which the motion of blood is free and active, evolving preternatural animal heat.* Secondly, *those in which the blood is either adhesive with little motion or already coagulated with no motion, giving out little or no heat;* and Thirdly, or lastly, *those (the central capillaries, which had been originally in a state of intense contraction) in which the blood is coagulated with no evolution of heat whatever, and consequently forms the coldest part of the disease.* These three varieties may be distinguished, for the sake of convenient description, as the first, second, and third *order* of dilated vessels, or from their relative positions, as the *excentric* or *outermost*, *median* or *intermediate*, and the *central* or *inmost* *dilated vessels of inflammation.* In the second species, or the median, the blood, or liquor sanguinis, having little or no motion, and being either dying or dead, and nearest the first series of vessels, that is, the outermost, and the source of animal heat favourable to the chemical changes required, is easily converted into pus, which for the same reasons is abundant there and more perfectly formed. In the third

kind of dilated capillaries, however, viz., the central capillaries, in which the dead lymph is farthest from the source of heat, the conversion into matter cannot be so easily accomplished, and must be necessarily imperfect, hence the central core or partially or imperfectly made pus in the centre of all abscesses. The suppuration in an abscess involves the clogged-up vessels, which liquefy along with their contents. In short, an incipient abscess may be described as consisting of three zones of dilated vessels, one within another, of which the excentric, characterised by free motion of blood, is the hottest; the median, by little motion and increasing obstruction, is moderately so, or simply warm; and lastly, the central or inmost, by no motion whatever, is the coldest of all; the first supplying preternatural heat, the second receiving the greater part of the same, produce the most and the best pus, and the third, partaking of least heat, forms little and the most imperfect variety of that fluid.

A certain degree of animal heat, as afforded by the free motion of an increased quantity of blood in dilated vessels, appears not only to be necessary to the change of liquor sanguinis concerned, into puriform matter, but to determine whether the pus is to be secreted by a natural surface or to be got rid of by an unnatural one by destruction of living tissue. For instance, if the lymph in the blocked up vessels of a part in a state of determination be equally heated (as in all the narrow tubes of the body, as the urethra, and the surface of the conjunctiva in purulent ophthalmia), every portion of it will be uniformly transformed into pus, as is the case in gonorrhœa, otorrhœa, ophthalmia, and bronchitis. In all these the mucous membrane, which is the subject of disease, has the same temperature all round, and easily secretes the unnatural humour without rupture of surface, as may be seen in the eyeballs. But on the other hand, if the same mucous membrane under similar circumstances be heated irregularly in consequence of their greater freedom of position and motion, so that some obstructed vessels have more warmth than others, as we find in the two inner zones of an incipient

abscess, collections of matter and ulceration will, as a matter of course, ensue. We find this in the alimentary canal, which has a remarkable tendency to run into ulcers when under productive determination or congestion. Why is the mucous membrane of the alimentary canal, which has the same structure as that of the bronchi and urethra, so prone to form little abscesses and ulcers? All other similar structures, as the synovial and serous membranes, resemble each other in the terminations of their determinations and congestions, wherever they may be found. Thus peritonitis and pleuritis both produce coagulable lymph. Why should the determination of mucous membranes then almost invariably terminate in one way in one place and another in a second. The only way in which we can reconcile this deviation in the case of the mucous coat of the alimentary canal under productive determination is to suppose that a certain amount of animal heat is necessary to the complete formation of pus, and that if this amount be withheld by some cause or other, or if it be in one place more, or another less, the production of the matter must be necessarily defective as we have seen in an abscess. The alimentary canal is so constituted that it would be almost impossible for its diseased mucous membrane to derive uniform warmth under the ordinary circumstances. In the first place, it is an independent tube, which prevents its sharing freely with the temperature of the walls and organs surrounding or near it, like the trachea, bronchiæ, and the urethra, which are, as it were, embedded in the midst of other tissues. In the second place, unlike others, it is a highly contractile organ, which causes it constantly to change its shapes and dimensions in a thousand ways, which must more or less affect the equal distribution of its temperature; and lastly, we must remember that it is the great highway of all kinds of matter which we take in as food, and which are apt to revert to the laws of inorganic life in a state of disease, so that it forms, here, a putrid mass, there, an acid, and in a third place, a foetid gas. These prominent peculiarities of the alimentary canal, viz., its freedom from other struc-

tures, its constant motion, and the quality and various alterations of its contents, cannot but fail to disturb the equality and supply of its temperature in disease, and thus to engender a tendency to form abscesses and ulcers.

Let us now see if the productive congestion and determination can give rise to gangrene. We have all along recognised two elements of determination and congestion, viz., spasm, or some cause of obstruction and dilatation of vessels. In the terminations of determinations and congestions which we have hitherto examined, both these elements prevailed in equal proportions, or nearly so, that is, there was as much dilatation as there was obstruction. This healthy balance, however, is sometimes unhappily destroyed in favour of obstruction, and the result is a mortification or death of the part so affected. Mortification may, in fact, be defined as an incipient abscess, without the first order of dilated vessels or complete obstruction of capillaries, with no spare tubes to dilate or carry on the circulation and repair or mitigate the mischief doing or already done. There is no sufficient heating process here, no friendly oven to liquefy and disperse the solid lymph, hence the icy coldness with which mortification makes its encroachments. In burns, small-pox, and compressed limbs, death takes place because there are no surplus vessels to relax, to keep pace with the increasing obstruction, and in like manner in intense common determination, in which parts die, being, as it were, choked up with lymph in all directions. Anything, in short, that prevents sufficient dilatation of vessels round a seat of obstruction will induce gangrene or mortification; hence its frequency in compressed parts, debilitated subjects, severe cases of burns, &c.

Determination and congestion, therefore, are capable of producing all those phenomena and results which are usually ascribed to inflammation, a so-called disease which therefore exists merely in our imagination, and which may easily be discarded with advantage to science.

We have here come to the conclusion of our enquiry into the morbid states of the muscular sense, and it is now for



our professional brethren to say if the endless conditions of the body which we have hitherto only partially traced, or merely hinted at, arising from the disturbance of this one single element, can be learned or taught to the student from the present scanty descriptions of those diseases with which the muscular structure is concerned. Is it not a matter of infinite surprise that, while we find everywhere thousands of works devoted to irritability, tonicity, inflammation, &c., to specious theories and dead morbid anatomy, there is not a single consistent and well filled treatise on vital morbid anatomy and physiology, founded on sober reasoning and closely observed living pathological facts. Dead morbid anatomy is the refuse of vital morbid anatomy; it is the history of what is past, and is an acquisition by the senses and knife, and all that we learn from it is from remote inference and much theory. But the morbid anatomy of the living (dissection by reasoning and experiments) is the foundation of that which we find in the dead; it is written with the present events of disease, and its knowledge is the more certain, because it is directly acquired by reason—the great internal eye by which we discern even the attributes of our Maker. The one is rational, and therefore the more certain, the other is sensual and liable to error.

We would advocate that the study of both be prosecuted with equal zeal and perseverance, so that they may mutually reflect light on each other.

The vitalists are, so to speak, the same to mortalists in medicine as the spiritualists to materialists in metaphysics. Let both unite, conciliate, and co-operate, and their fruits will truly be labour's worth and great.

## CHAPTER XII.

## MORBID STATE OF THE NERVOUS SENSE.

By nervous sense we mean that power of the nervous system (derived from the digestion of the redundant resident sense of cells and fibres), by the exercise of which the phenomena peculiar to that system are performed. It is a finer power than the muscular, being originally elicited or struck off from the inherent motor sense of tissues in contact with various matters in and out of the animal; it is afterwards sucked up, so to speak, and modified by the nerves to produce their diverse actions.

It is liable to be deranged in various ways, and these derangements are either *cognizant* or *recognizant*, as they refer to any particular disease local or more extended, or to the state of the whole body that disease induces. *Cognizance*, as we have pointed out in the beginning of our course, extends no farther than a certain malady and its symptoms, and is what the ordinary pathology principally aims at. *Recognizance*, however, precedes, accompanies, and succeeds disease, as it is at present understood, and constitutes a higher branch of study, to be prosecuted by the advanced student before he launches himself into practice.

For practical purposes we shall treat of the excitants of nervous power, or the causes of nervous manifestations, as of two kinds, viz., external, as the material agents (within this term we must include the so-called force or forces), and internal, as the influences generated in the brain, spinal marrow, and ganglia. The impressions of external agents which are made on the extreme loops of nerves, and thence transmitted upwards by the channels of afferent tubes to the brain, spinal cord, and ganglia, are naturally more or less *discordant*,

*crude, and undefined*, compared with those conveyed from the grey centres by the efferent twigs to the periphery; they appear to undergo some changes, some hewing and chewing, some remodelling, some arrangement, some order, in the grey portion of the nervous masses, so as to become more or less *accordant, pure, methodical, and definite*. For instance, when the sense of motion, or motor sense, is excited by an external excitant, such as by electricity applied to a muscle, contraction follows, but of the number, duration, extent, and intensity, of which we can form no previous estimate. There may be one or more contractions; they may be excessive, defective, and perverted, and may last a longer or a shorter time, and so on. But when the same muscle is excited by volition or spinal influence, the motions that ensue have, we know, a definite proportion and order. The impressions of heat and cold are naturally confused beyond all measure; they may be too much or too little, pleasurable or painful, &c.; but it is when we employ artificial means or animal efforts, in other words, some internal stimuli are used by which we are led to resort to clothing, &c., that they assume a certain standard in relation to the living body, and become agreeable and subservient to our wants. The same law holds with the operations of other external agents compared with those of internal stimuli, as of the ganglia, spinal marrow, and the brain. That is, that the external objects operate always disproportionately at discord with the body, unlike the cerebral, and spino-ganglionic masses which act with some proportion, and a definite object to the animal. Thus, when the eye opens, a whole landscape is depicted on the retina, causing a confused discordant impression, which can serve no purpose to us until we turn our attention (a cerebral impression) to the whole, or part of it, by which act the impression rises to the stage of sensation (vision), which is of a limited character, and accords with the amount of the perspective faculty employed. The impressions of some of the natural stimuli within the body, as of food in the alimentary canal, blood in the heart and arteries, &c., are of a general or indefinite character, and must

be regarded as those of external objects, because they are made on the afferent nerves.

As these two forms of impression so widely varying from each other, viz., those arising from external agents, including food, blood, &c., and those from the central masses of the nervous system, the one carried up inwardly by the afferent nerves, and the other conveyed outwardly by the efferent branches, have not hitherto been sufficiently and methodically unfolded, we shall, in attempting to do so, designate them respectively *discordant* and *accordant impressions*, and the nerves through which they are manifested, *discordant* and *accordant nerves*.

The discordant impression, or *discordance*, extends from the general periphery of the body (cutaneous, muscular, &c.) to where the afferent nerves terminate, and the accordant impression or *accordance*, from the grey centres and ganglia to the ends of the efferent twigs in the various structures and organs of the animal. They may be subdivided into *motor* and *sentient* discordance and accordance, and these further into *cerebral*, *spinal*, and *ganglionic*. We shall, therefore, speak of the *cerebral*, *spinal*, and *ganglionic*, *motor* and *sentient*, *discordance* and *accordance*. The cerebral sentient accordance is naturally a sensation; that is, what the mind perceives, but the sentient spino-ganglionic accordance is also a like sensation, which, although we do not usually feel in health, we do so in disease, as the pain of gastritis, angina pectoris, arthritis, &c.

Nerves, whether they are discordant or accordant—that is, whether they conduct peripheral or central impressions—are nevertheless identical in structure and function; they both cause pain, when cut or irritated, and the pain is of the same kind in both; they are equally liable to disease, and they are both used for the transmission of impressions.

Discordance and accordance may be varied in two ways, viz., with regard to *the passage of impressions*, and *their nature and intensity*, and they may be also *excessive*, *defective*, and *perverted*. Discordance and accordance may be full and intense,

yet its passage may be defective, as in paralysis, of sensation and motion, injury of the spinal marrow, persons partially asleep, &c.; or they may be defective with excessive passage, as in the sensations and movements of irritable persons. They are also perverted, as we see in tingling feelings and delirium tremens. Excessive passage is also manifested in the quick conduction of an impression to and from the nervous centres, *of the contact of heat*, as in burning, and the volitions of an angry person.

We must here remark, that the discordant impressions, although we are aware of their existence from their constant operation from all sides on our body and mind, are in reality not felt by us, but we know them by inference, as causes from their effects. The moment, however, they reach the grey centres and ganglia, a sensation is produced (*sentient accordance*) which becomes motor influence or power, if afterwards transmitted by efferent nerves to muscles (*motor accordance*). It is, therefore, the accordant impressions which we truly feel either in the brain (personal consciousness) or in the spinal marrow and ganglia (spino-ganglionic or organic consciousness). In health, as we have said before, the accordant impressions are of some definite proportion and order, but in disease it is the reverse, they becoming wild and discordant. The real discordant impressions are always wild and absolutely disproportionate; the accordant ones turn out so only in consequence of disease. The reader will then perceive that in the investigation of nervous phenomena, we have *chiefly* to deal with *morbid accordance*, *sentient*, and *motor*, the former in the grey centres, and the latter in the efferent nerves. The nervous system may be compared to an animal whose head is formed of the central grey masses, and body of the efferent nerves, looking through a telescope, viz., the afferent nerves.

Motor accordance, excessive, is seen in the painful contractions of cholera, hydrophobia, tetanus, spasm of the stomach in gout, griping of the intestines, &c.; the same, defective, in paralysis of muscles, relaxation of arteries and capillaries



and lastly, the same, perverted, in the irregular movements of delirium tremens and chorea. On the other hand, sentient accordance is witnessed, when excessive, in tenesmus, the pain of productive determination and congestion, intolerance of light and sound, extreme sensitiveness of the skin, &c.; when defective, in amaurosis, debility, and weakness of fever, sinking in diseases, faintness, hopelessness, melancholia, hebetude, dullness, paralysis of sensation, &c., and lastly, when perverted, in the craving for nasty food, nausea, *muscæ volitantes*, restlessness, *adynamia* of fever, sensation of pins and needles, &c.

We have yet to point out another class of impressions, perhaps the most important of all as regards the well-being of the animal, viz., those arising from a simultaneous presence or coexistence of discordant and accordant impressions. These we shall call *concordant impressions*, or *concordance*. The body, or parts of it, in a state of concordance may be compared to a wedge jammed in between two powerfully compressing surfaces, viz., the external world, and the brain, spinal marrow and ganglia, each, as it were, striving to meet the other in close approximation by their peculiar impressions through the intervening wedge.

Now where are we to seek for these concordant impressions? What is a tonic spasm? A tonic spasm is the result of a durable contraction arising from the remote existing cause of muscular action, and the reflected influence of that cause quickly transmitted by the motor nerve to the muscle, continuing to operate together for some time. It may be likened to a child which has lived a few days; it is the emblem of the life of a muscular contraction. What imparts this life, this duration of a contraction? Every period of life is a mark of some co-existence or co-operation, or simultaneous opposing action. Do we not recognize this element of life in the phenomena of a durable muscular action? Is not here the foreign impression excited somewhere, say, by the poison of tetanus, acting indirectly on the muscular fibre in concordance with that supplied by the nervous centres? Can we

doubt in the tetanic patient, the existence of the disease, and the nervous system at the same time? Can we further deny the poison of tetanus, a foreign matter, and the nervous system, their power of creating impressions, and also the passage of these impressions by the afferent and efferent nerves to the muscles, &c. We have no proof; on the contrary, an accordant impression is generally, no doubt, the immediate inducing cause of muscular action, but it is impossible to suppose that this action should have any continuance if the remote or original exciting cause of contraction, as the poison of tetanus, has ceased to act on the afferent side of the body, or, in other words, without a concordance so as to keep up a continued supply of motor impressions, which is necessary to the persistence of spasm.\*

We have shown elsewhere that where there is a co-existence of any two forces, which act in obstinate opposition to each other, motion is impossible, as in catalepsy.

Do we not observe this necessary result in the continued violent contraction of the muscles in opisthotonus. Is not the contraction of muscle in reality fixed here, unable to relax or move, as long as the concordance or the simultaneous opposition of the discordant and accordant impressions continue? In short, we are so fully convinced of the necessary intervention of concordance as the chief cause of durable contraction of muscles in disease, that we do not hesitate to lay it down as a general principle for all structures, that is, that without a similar conjunction of impressions, any duration of their functions is impossible. The tonic spasms are entirely dependant on the nervous system, and afford a beautiful illustration of nervous phenomena in muscles in complex animals. As we cannot go on seeing without some object continuing to obtrude or impinge on the seat or field of vision, so it is with the tonic spasm, which cannot be, without something persevering to excite the muscle, which as a matter of course means that there should exist a source of

\* N.B. No doubt as regards voluntary muscles, they might continue a spasm for a time, but it cannot make it persistent.

continued discordance and accordance. Tonic spasms may be more properly called *concordant spasms* in contradistinction to the *clonic*, which we shall name *accordant spasm*. In concordant spasm the contraction continues for a longer or shorter time according to the duration of concordance; but in the accordant it is momentary, being the result of a single accordance, the discordant impression having ceased to act or operating interruptedly. The terms tonic and clonic are vulgar, and convey a forced meaning, and we may well chase them out from the language of rational medicine. The spasms of tetanus and hydrophobia are generally concordant, and those of common convulsions, hysteria, epilepsy, &c., accordant. These two varieties of spasms, however, are not to be confounded with the *co-existent* and *existent* contractions formerly described in connection with the muscular sense of voluntary muscles, the former two terms refer to the nature of individual spasms, but the latter to their relation with one another or to other spasms.

We have just now said that every durable phenomenon supposes *concordant impressions*, and also, that *concordance* is one of the most frequent and useful functions in our general economy. We shall now see if we can be borne out in these statements by other instances of animal functions in health and disease.

We have durable contraction and pain in wry-neck, recent unreduced dislocations, and fractures, &c. In every one of these cases, on careful attention, it would be found that the muscles are in the same state of concordance as in tetanus; something must be the cause of pain in the nerves, and of contraction in the muscles, that is, discordant impressions, of which the increased sensibility and spasm are the concordant effects; the discordance also lasts here for some time, hence the continued suffering and contraction.

Let us attend to some of the most striking instances of our actions, such as leaping, walking, catching or squeezing objects, lifting of some weight, climbing, writing, drawing, wrestling, &c. In leaping we take some time to make sure

of the ground ; we cannot leap from a miry or slippery place, we want a hard soil to press our feet upon, that is, to cause a *discordant impression* (of solidity) ; as soon as we are aware of the impression of a firm hard soil, we send down a voluntary muscular impression (*accordance*) to oppose it on the ground at the same time, so as to establish a *concordance*. Again, when we squeeze or support an object, or try to suspend ourselves by catching hold of a rope, &c., the duration of these actions will entirely depend on the longer or shorter time we can resist the impression of these bodies with our own voluntary strength, that is, as long as we can maintain a concordance. Concordance is therefore not only unquestionable, but the cause of most of our exertions. We stand, sit, and recline by concordance, that is, by the meeting of two contemporaneous impressions, one from without, as of the ground, sofa, &c., and the other from within, as the mind. If there were no mental co-operation, we could not keep ourselves erect, as in the gait of a drunken man or the inert posture of a dead body. The world is too big for one man, his accordant impressions being too few and feeble to do single combat with its inexhaustible discordance.

The action of the heart is naturally accordant, but that of the arteries concordant. These vessels, as we have shown before, possess contractility, by which they maintain an even tension or pressure on the column of blood within them. Their contraction is slow, gradual, and, more properly speaking, continuous and ceaseless. Now, how is this continuous, ever present contraction induced ? We have here as the cause of discordant impression the ever-moving blood, and as of accordance the efferent influence of the ganglia ; the impression of blood on the internal tunic of arteries is ceaseless, and so is that reflected from the ganglionic centres on the muscular fibres of those vessels. In fact, the so-called tonicity of arteries, the inherent contractility of their middle coat, is kept in play solely by an act of concordance. The stomach and the bladder in like manner perform their peculiar motions by opposed co-existent impressions.

But would the senses supply us with examples of concordance? Let us depict a scene on the retina and convey it to the brain (*discordance*) and observe what follows. The mind soon takes notice of the picture (*sentient accordance*) and sees it, constituting true perception or vision. Now it is possible for the scene to remain a longer or shorter time before the eye, and the mind may persist in seeing it. Such being the case, there must be a necessary concordance of vision. The same may be said of the other senses which are daily acting by concordant impressions. Need we again repeat that any life, duration, or continuity of an animal action, requires as its essential condition repeated or continued nervous concordance.

All our habits, natural, professional, or otherwise, are the results of prolonged concordant impressions. Thus, the alimentary canal, which is so formed as to act both downwards and upwards, as seen in defæcation and vomiting, and in animalcules without an anus, is naturally in the habit of propelling things downwards, simply from the fact of its constantly moving by concordance, and its having an anal outlet. The food in its various states of change excites a *discordance* on the mucous lining of the intestines, to which an *accordant ganglionic motor influence* soon responds; this being daily kept up for a time, gradually leads to the habit of a particular motion. In vomiting we have to overcome this habit, and hence the greater exertions required in that act than in defæcation. We shall here adduce one instance of the professional habits originating from the persistence of concordance.

The act of writing is truly a *concordance*, which has its elements in the resistance of the quill (*discordance*), and that of the muscles of the hand at the same time (*motor accordance*). Now continue this concordance for a longer or shorter period, for some days or months, as in the novice writer, and the writing will not only be extremely easy, but after a further practice will not, perhaps, cost him a single effort, unless it be carried to an extraordinary extent. The tissues and im-



pressions concerned in this useful habit become more and more accommodating to each other by persistence, carrying on a system, as it were, of independent mutual responsiveness, and the brain influencing the act, partakes in course of time, as regards this particular operation, more or less of the character of the spinal marrow and ganglia, unconscious of its own exertions in writing.

As a further proof that habits are necessary consequences of continued co-existent impressions acting in opposition, we cannot do better than take a short glance at the history of a child from the time of his birth to a period when he begins to contract habits.

When a child makes its entrance into the world, the first impression that meets him is that of the external heat or cold, and the contact of the atmosphere which he breathes and which surround him. To this is opposed an instantaneous resistant impression from within, expressed by his shrill persistent cries. These impressions go on acting upon each other till death, but the cry gradually ceases after a few days or weeks, showing there is no longer any distress from exposure to air, or painful consciousness from it on the part of the child, that is, in other words, the child has become habituated to the atmospheric sensations. The same may be said of his other habits. At first the light is too intense and painful to his delicate eyes, and the noise too discordant and deafening to his tender ears, but by concordance he soon becomes friendly with both.

Our habit of recollecting events, or memory, is entirely a result of repeated concordance. Thus, when we see an object, in order that we may remember it, it is necessary that we should not only continue to view it, but view it often, that is, we should conjoin repeatedly our own impressions (*perceptive accordance*), with those of the external agents (*discordance*). Indeed our memory of things is in exact proportion to the duration and number of concordances. Association is a ladder to memory, but concordance is its foundation. Objects which we daily meet with we are in the habit of knowing

best, and we can seldom forget them. We know intensely the Me and its wants, because the knowledge of the self and its relations has accompanied us throughout the whole period we have lived. Hence we magnify ourselves most (*personal vanity*), and provide for our own safety first, often at the sacrifice of our nearest relations and dearest interests (*selfishness*). Indeed, God, the father of this beautiful creation, and who has made us, is still a discordant impression to most of us, to which, unless we constantly, faithfully, and earnestly apply our own accordant submission or contemplation, so as to occasion a continual spiritual concordance, we shall never attain to that harmonical everlasting habit of unconsciousness of the present, in the happy consciousness of the future world.

All the diseases of any continuance, and their remedies act by the conjunction of their own impressions with those of the living body, that is, by *concordance*. For example, effluvia entering into the body causes a discordant impression, to which, by the laws of the animal economy, we respond by an accordant resistance, and when the salutary resistance is feeble, the result is a plague, small-pox, fever, cholera, &c., according to the nature of the poison to which we are exposed. The operation of medicinal agents admit of a similar explanation. Thus opium, when taken, causes its peculiar discordant impression, to which we accord by that of the nervous centres, the consequence being a collision of impressions, or concordance, which is narcotism in a novice opium eater. Let him practise this for a time, and he would soon be almost as little conscious of the effects of opium-eating, provided the dose is not suddenly increased, as the professional clerk of the efforts of writing. In both there is a habit, the narcotism produced and words written, although the mind appears to remain inactive and almost unconscious of those events.\*

It would not be uninteresting to offer in this place a few hints as to the order and mood in which the two forms of im-

\* N.B. As a matter of fact, in cases where a medicinal or other agent is likely to prove hurtful or incompatible with the well-being of the system,

pressions we have described appear and succeed each other in health and disease. We shall not enter into such questions as to what is the origin and the manner of production of these impressions; such discussions will be of little avail in practice. We shall therefore, as it were, overtake them at the point of their present manifestation and progress in the living body.

In that part of the animal frame which is not within the immediate control of the will, it may be said generally, that the discordant impressions are the first to appear, and the accordant soon after. Where, however, the mind presides over our government, this order is often reversed; and an accordant impression may precede a discordant one. As an example, when with closed eyes I say I will see, here it will be observed the volition (accordance) is the first in the field. Again, there may be a succession of accordant impressions, without any intervening discordance, as when one volition nullifies another.

Thus, when I will to move my arm, and before I have executed this will I make another and revoke it, saying, I will not move my arm (elements of human liberty). In the same manner there may be many discordant impressions without a decided accordance. For instance, when the eyes, ears, nose, and tongue are simultaneously impressed by their peculiar stimuli, the mind, although it may be perfectly healthy, cannot take cognisance of any of these impressions, and remains, as it were, vacant for the time being, on account of the essential individuality of attention. The mind sometimes fails to produce accordance by disease, as in some cases of insanity. Similar states may occur with regard to organic nervous phenomena.

We shall now proceed to notice briefly the morbid accordant and concordant impressions, *motor* and *sentient*, first of the brain, and then of the spinal marrow and ganglia.

nature generally endeavours to repel and thus get rid of such substances by repeated accordance; concordance, under these circumstances, is, therefore, not usually established, and when it does take place, it commonly quickly leads to disease by reason of its injurious tendencies, instead of to a habit, which requires a prolonged and comparatively innocuous concordance.

## CHAPTER XIII.

MORBID CEREBRAL ACCORDANCE AND  
CONCORDANCE.*Morbid Cerebral Motor Accordance and Concordance.*

MOTOR morbid accordance of the brain may be seen, when *excessive*, in hydrophobia, tetanus, general convulsions, hysteria, epilepsy, &c.; when *defective*, in paralysis of motion, weakness of voluntary muscles, debility, &c.; and lastly, when *perverted*, in chorea, delirium tremens, rigors of fever, &c. Perverted morbid concordance, when *excessive*, is manifested in catalepsy, lockjaw, tonic spasm of opisthotonos, pluerosthotonos, &c., and, when *defective*, in many cases of asphyxia and compression of the brain, in which, although the discordant impressions of the disease may continue to act, yet the muscles do not contract with their ordinary strength, owing to imperfect cerebral accordance.

*Morbid Cerebral Sentient Accordance and Concordance.*

Under this head we shall include the phenomena of the ordinary senses viz., those of sight, smell, hearing, touch, and taste.

*Sense of Vision.*

When an object is painted on the retina it is necessary in order that there may be complete vision, that we should attend to, and take notice of it, that is, we cannot see until the mind and the rational image come to a sort of collision through their impressions. In other words, an accordance of the mind to the discordance of the body to be seen, is an essential condition of the act of seeing. The image formed in the eye is said to be naturally inverted, and that we see it erect by reason of habit. This explanation appears to us to be as fanciful as we believe it untrue.

An inverted position pre-supposes an erect one, and the latter pre-supposes a fixed plane, in relation to which bodies

are judged to be erect or turned upside down. Let us now consider this plane to be the surface of the earth and see what takes place in the phenomena of vision. I am looking at a tree, and according to the laws of optics the tree is inverted in the eye. But what is the actual condition of this inversion? Is the tree actually uprooted and its roots pointed to the heavens, or does it still fix itself on the ground? The tree certainly, as represented in the eye, still sticks to the earth by its roots, and the root of the tree, and the ground on which it stands, are seen together retaining their former relations with regard to each other. But where are we viewing this tree from? Are we not standing on the same ground with the same tree and preserving the same relations with it as before? If the tree therefore be inverted, of which there is no doubt, we must ourselves be inverted with it at the same time, for in the field of vision we are both on the same plane, which we cannot change, and both keep on the same original posture in relation to it, which is that of being erect. It is true we do not see our feet every time we see an object, but still we know that objects when they become visible are always seen in relation to a certain plane, which, if it be the ground, we must observe things erect; if a wall, they will appear crossing us; if a roof, the same will look inverted, and so on.

Like other senses, that of sight may be *excessive*, *defective*, and *perverted*. Optical accordance, excessive, is exemplified in the intolerance of light in ophthalmia, exaggerated sensibility of the eyes generally, painful sight of water, and certain colours in hydrophobia, &c.; it is defective in glaucoma, amaurosis, dimness and weakness of sight, night and day blindness, &c.; and lastly, it is perverted in ocular spectra, optical illusions, irritability of the eyes, &c. The views of beautiful and lovely scenes and of rare and interesting objects are instances of excessive accordance in health; in the same manner things daily seen and of no attraction elicit a dull accordance (indifferent sight).

Perceptions of the eye or visual impressions being prolonged would resolve into a state of concordance, and by



repeating the latter frequently we shall acquire habits of vision. The ease and almost unconsciousness with which we see things that appear daily before us, our relations and friends, &c., is familiar to us all. The visual habits may be superficial or deep, according as the extent of the previous accordance was slight and partial, or minute and searching, as the sight of the sick to the ordinary bystander and the same to a medical man. Concordance, when sudden and violent, or carried beyond a certain limit at one time, becomes hurtful to the eyes, as when one gets dazzled by looking at the sun and blinded by viewing too minutely a certain object. This latter observation will apply to all the other senses.

### *Sense of Smelling.*

Some people are more sensitive to certain odours than others, and some are quite indifferent to many. Scheinederian accordance is remarkably and painfully exaggerated in some diseases, as indigestion, anæmia, hysteria, &c., in which the mildest and sweetest scents sometimes impress too strongly and are rejected with disgust. The pungent smells are both excessive and disagreeable. Females have naturally more acute powers of smell than males. This arises partly from the greater nervousness of their delicate make and partly from their constrained intercourse with society and nature. The power of smell is diminished in cases of disease of the mucous membrane of the nose or of the olfactory nerve, also in intoxication, sedative poisoning, asphyxia, &c.; and lastly, it is perverted in the apparent pleasure with which the insane resist the filthy odours, aversion to certain scents from prejudice, ignorance, disease, or idiosyncrasy, and in the fortitude of medical men in the dead-house and hospital wards, and of sweepers, shepherds, &c., in their respective avocations. In all such professions the organ of smell is soon brought into a state of concordance and habit by the accordant and discordant impressions continuing to beat upon each other simultaneously for a longer or shorter time.

If the concordance be sudden and intense, there may be temporary loss of smell, as if by shock.

*Sense of Hearing.*

The function of hearing is performed and conducted in the same manner as that of other senses. There are the same two impressions, viz., the external and the internal; the former as the concussion of the air, and the latter the notice taken of it by the brain, that is, the same discordance and accordance as in the play of other nervous functions.

Morbid auditory accordance in excess, may be found in painful hearing, intolerance of noise, and the acute power of catching sounds in many diseases, so that the faintest whisper and the gentlest rustling is enough to put a patient out of temper. Fear, danger, solitude, and silence increase our hearing power, and how often is the least sound of hope and succour caught up with the readiness of instinct. It may be observed in defect, in deafness, otorrhœa, otitis, coma, narcotic poisoning, disease of the auditory nerve, mechanical defect of apparatus, &c.; and lastly, it is seen in perversion in the various noises in the ears accompanying disease, as ringing, tinkling, sawing, blowing, crackling, beating, &c. Many of the above cases are at the same time instances of concordant audition. Music is a concordance, viz., a continuous flow of regulated harmonical intonations combined with deep attention. Repeated concordance, while it engenders a habit of hearing, if too violent, may produce temporary deafness, as when we hear an uninterrupted violent cannonade.

*Morbid Accordance of the Tongue.*

The tongue is the chief organ of taste, which of all senses is the most frequently altered in disease. It is easily excited and recalled. How often we find our patients reciting to us various kinds of food and drink, of delicious taste and flavour, of which they partook in health in hopes of our recommending them as sick diet. With many "the grapes are sour."

It is excessive in covetousness, and the longing for food during convalescence, and defective and perverted in three-fourths of our ailments. It is foul or nauseous, bland or indifferent, watery or dry, sour or bitter, metallic or astringent, &c., &c. It becomes concordant when we eat with great gusto, and a habit when frequently repeated. Habitual tastes, if indulged in, prove injurious; hence nature often compels us to give them up for a time, as when we have used the same food or dish daily for several days or weeks. Here the habit soon grows into disgust, followed by an abandonment of the particular aliment.

*Morbid Accordance of the Skin.*

The skin discovers to us the idea of body and of external temperature, and forms a vast outlet and field or hotbed of disease. Cutaneous accordance, excessive, may be noticed in the increased sense of heat and cold in fever, the feeling of burning, itching of the skin, and agony of determination and congestion, &c. The same, defective, in paralysis of sensation, coma, asphyxia, sedative poisoning, mesmerism, &c.; and lastly, the same perverted, in the sensations of pins and needles, soreness, chilliness, feeling of heat, fornication, the peculiar sensibility of the skin in hydrophobic patients, who catch, as it were, the very sighs of the wind, &c.

As an instance of cutaneous concordance, we may point out the touch of the quill when writing, or of the knife and sword in eating and fighting; in like manner, the callous feeling in the hands of the artisan and the field labourer in grasping their professional tools, may be cited as an example of cutaneous habit.

We ought to caution our readers here against their confounding a mental act with the ordinary phenomena of the nervous system. The nervous system, whether it is the brain, spinal marrow, or ganglia, always strikes its own impression (accordance) on that of a foreign body (discordance) independently of the mind. For instance, when there is an image on the retina, there is an immediate cerebral accordance

without our helping it; but the mind is naturally so interwoven with the ordinary operations of the brain, that we cannot refrain from attending to or seeing it at the same time. So with the organs of hearing in a sound state, we cannot help recording a cannonading by our will or attention. A mental act may be free, as volitions, contemplations, &c.; but when any of the functions of the animal frame is to be performed which function is so interwoven with the brain, the organ of the mind, that the latter cannot be entirely apathetic, but must act in some concert with the body; the mind is in this respect, as it were, at once the master and the slave. We can touch, taste, hear, or see at our own will, but when we are touched, when a bitter is in contact with the tongue, when there is some image before the retina, &c., we must attend to the sensations they create, as a matter of necessity, by a mental accordance. In fact, in the act of hearing, smelling, &c., attended with consciousness, there is a mental as well as a cerebral accordance. As it is sometimes impossible to separate a mental from a cerebral accordance unless the mind be deeply absorbed or destroyed, we have hitherto made no distinction between those two functions in our account of the phenomena of the nervous system. The brain, in every respect, is like a portion of the spinal marrow which has become considerably enlarged to fulfil a higher destiny in its greater subserviency to the soul. The cerebral nerves of voluntary motion represent the anterior motor roots and nerves of the spinal axis, and those of sensation, as the optic, olfactory, the gustatory, branches of the fifth pair, &c., the posterior sensitive roots and nerves of that axis. It differs only in this, that it is intimately connected with the phenomena of consciousness, so that, while the reflex spinal function can take place without our knowing it, a reflex cerebral action must be noticed by us. In disease, however, we are apprised of the spinal, just as well as of the ordinary cerebral accords, as pain in the shoulder, testicles, breasts, &c.

## CHAPTER XIV.

MORBID SPINO-GANGLIONIC ACCORDANCES AND  
CONCORDANCES.1st. *The Alimentary Canal.*

EXCESSIVE accordance (*motor*) in the alimentary canal may be seen in vomiting, straining, and bearing down contractions in dysentery and prolapsus ani, gripes, spasmodic stricture in colic and ileus, spasm of the stomach in gout, violent closure of the constrictor-muscles of the throat and anus, motion of the intestines in violent purging, &c.; the same, when *sentient*, is to be found in the burning hot and pungent sensations in the stomach, acute pain in gastritis and enteritis, the twisting pain of hernia and intussusception, the straining and griping of dysentery, &c.

Motor and sentient accordances become, likewise, defective, the former, as in costiveness, from a sluggish state of the intestines; prolapsus ani, from looseness of the anal muscles; defective motion in lead colic; dysphagia, from paralysis of the gullet; the distended stomach of phthisical patients, &c., and the latter in the easy discharge of cholera stools; hectic diarrhœa (in which little or no pain is felt), the condition of the stomach of the inveterate drunkard, who swallows raw brandy as water, &c.

Under the head of perverted accordance, we may enumerate as *motor*, spasmodic stricture of the œsophagus, lockjaw, the irregularly successive contractions of lientery, vomiting, eructation, hiccough, cramps in the stomach and intestines, &c., and as *sentient*, dryness of the throat, itching, and irritation in the anus and rectum, feelings of sinking and weight in the stomach, voracity, unquenchable thirst, nausea, and disgust for food, &c.

In the alimentary canal, we also meet with many states



of concordance and habit. Thus the contraction and pain of the gullet or intestines in consequence of some impaction, as intussusception, are concordant, the impressions of the foreign body, and those of the spinal marrow and ganglia persisting in opposing each other. Habits, we know, are easily acquired by repetition of concordant impressions, but they are with great difficulty eradicated; some people are in the habit of eating rice all their lives, some bread, some meat, some opium, some arsenic, &c. In the commencement of the fruit season, we are liable to suffer from diarrhœa, dysentery, and indigestion, which, however, disappear as the season advances, or as we get accustomed to digest fruits well, or establish a habit of digesting them by repeated concordances.

*2nd. Motor Accordance and Concordance of the Heart and Arteries.*

The action of the heart is usually one of accordance which becomes excessive, as in simple hypertrophy with good blood, and defective and perverted when these conditions are reversed, viz., dilated hypertrophy, with poverty of blood. It may also be more or less concordant, as in a case in which the ventricles of the heart during systoli are not entirely emptied, owing to some disease or defect of the valves causing regurgitation, thus setting up a constant discordance.

The arterial contraction is the result of one life-long concordance. It may be, in like manner, *excessive*, as in plethora, spasm of capillaries, as a frequent source of determination and congestion, contraction of vessels from cold, &c. *Defective* as in the dilated vessels of congestion and determination, sedative medication, anæmia, &c., and *perverted*, as in paleness from fright, flush of any disease, the weakened vessels of delirium tremens, &c.

The state of the nervous system in relation to the respiratory functions in disease, admits of a similar analysis to that with regard to simple alimentation and circulation, which we have here so briefly noticed.

## CHAPTER XV.

SPINO-GANGLIONIC SENSE COMPREHENDING  
SPINAL AND GANGLIONIC ACCORDANCES AND  
CONCORDANCES.

WE can view the spinal chord and ganglia and their nerves in no other light than as mere extensions of the brain into the body, to regulate and preside over the functions of organic life. As these two extensive offshoots of the nervous system are most intimately connected with each other in the discharge of their various offices, it would be convenient to describe their phenomena under one head, viz., that of spino-ganglionic sense. This sense comports itself in every way as one of the ordinary senses, with this exception, that it generates a motor power similar to that of the brain, without involving consciousness, in order that it may produce a constant concordance of its own—an element of habit—by which on ordinary occasions it is enabled to maintain its own government, without the necessity of a frequent reference to the council chamber of the mind.

The mind, with the ordinary senses and the brain, serves, so to speak, as a guardian to the flesh against its external dangers, and watches over the exportation from and importation to the corporeal country—the body. It is, as it were, the military department of the animal, with a good commissary-general at its head. On the other hand, the civil department, with all the details of internal commerce, and the order, peace, and economy of the bodily commonwealth (digestion, circulation, and nutrition), is devolved on the spinal marrow and ganglia. We have already dwelt upon the phenomena of digestion and circulation in connection with the organic muscles, and also pointed out their relations with those of the

nervous system. We have, therefore, now to confine ourselves chiefly to those of nutrition and secretion.

We need not premise that the ganglia, spinal chord and the brain will all act in a similar manner, that is, on a foreign impression by one excited in either of those centres. For instance, when our eyes shut instinctively in consequence of some foreign body entering into them, and after the extraneous matter is picked out, we open them to ascertain what the offending particles were. In both these acts, we observe the same conjunction of the two impressions, viz., one from the foreign body, and the other from the brain. The foreign body, as soon as it touches the conjunctiva, or is held before the eyes, causes an instantaneous impression, either of irritation or of image on the retina, which is conveyed inwardly by the branches of the fifth pair of nerves, or the optic, to meet an impression from the brain outwardly, which ends in closing the eyes or seeing the object. Do we have anything similar in the phenomena depending on the spinal marrow and ganglia? We eat something, and it causes an impression on the gastric nerves. This impression, we know, is carried up to the medulla oblongata, from which originate a motor influence or impression, the cause of the churning motion of the stomach. Is not the motion of the stomach here effected in the same way as the involuntary closing of the eyes, each being the result of a reflex action? The same reflex action may be said to characterize the functions of the ganglia. We have reason to suppose that when there is food in the stomach, its presence is soon communicated to the solar ganglion, which takes cognizance of the fact, and then sends forth an impression or accordance of its own for the secretion of the gastric juice. The ganglionic action here is to be compared with the act of vision.

In the spinal chord and ganglia, viewed as a compound organ of sense, it is necessary that there should be the same conditions for the execution of its functions as are found to be essential to the exercise of the ordinary senses. Thus, in the organ of smell, we must have an odour to act upon an ex-

panded nervous surface for the odoriferous particles to impinge on (*Scheiuderian membrane*), a nerve to carry the impression of the scent to the brain (*olfactory nerve*), and, lastly, a nervous centre to perceive the smell (the *brain*). Have we these, or similar to these, conditions in the phenomena of the spinal chord and ganglia? A little reflection will enable us to answer in the affirmative. Physiology has unfolded to the student many of the secrets of nature, and has told him that the blood, or liquor sanguinis, is the only food of the living body, and its cells and fibres; that these cells and fibres are constantly in a state of change, plastic and metabolic by their permeability and inherent chemical powers; that they are chiefly employed in sucking in the liquor of the blood, and converting it into their own tissues; that they are extending, multiplying, and dying away every moment of life, being replaced by identical substitutes; and that there is, in short, a perpetual consumption and want of material on the one hand, and its supply, assimilation, and waste on the other. All these facts have been established on most indisputable evidence. The question now is, whether the liquor sanguinis (which may be described as existing in three stages, viz., the *primitive*, *nutritive*, and *secretive or excretive*, the first in contact with tissues, the second incorporated with their substance, and the third as waste, lying, as it were, outside of them) acts in some way as a cause of impression on the spinal and ganglionic nerves, as the odour on the Scheiuderian membrane, to excite spinal and ganglionic accordances and concordances. If it does not behave to the spino-ganglionic sense in the same way as odour to the nose, sound to the ears, light to the eyes, external agents to the tongue and skin, whence, it might be asked, comes our hunger, the feeling of satiety, thirst, dirtiness of the mouth, perverted taste, &c.? How is it that we feel weakness and debility, languor and lassitude, strength and tone of continued health, &c.? The brain and the mind feel these sensations, but they do not originate them. Can the mind, the immediate superintendent of the cerebral operations, produce, renew, or remove them at plea-

sure? What control can the mind exercise on hunger, beyond a distant one, more of a republican and argumentative character than of absolute power? When we are weakened by disease, can we persuade ourselves to the contrary? Surely, the mind, although it is made aware of these sensations, is not the place where they originally came from. They owe their birth to the spino-ganglionic centres, just as the sensations of light and sound have their womb in the brain.

Let us now see if we can trace the organic sensations, morbid and healthy, to the reciprocal impressions of the liquor sanguinis and the spino-ganglionic centres.

What is hunger? Is it a sensation, or the expression of a sensation? Is it a feeling generated in the stomach or elsewhere in the whole body? There can be no question that the feeling of hunger proceeds from want of liquor sanguinis in the whole body, first made known to the ganglia, and afterwards to the brain, through the medium of the afferent, gastric, and other nerves. It is, as it were, a sensation in the ganglia (organic or vegetative), which we do not directly feel, and an expression or reflection of that sensation in the mind through the stomachic and other nerves; and consequently requires the same conditions for its production and manifestation as the ordinary sensations, as of light, sound, taste, touch, &c. The diminution of liquor sanguinis creates an impression on the afferent branches of ganglionic nerves (*organic discordance*) in the same way as an imperfectly illuminated object causes a dim picture on the retina (*animal discordance*). The organic discordance is soon carried up to the ganglia, to be recorded there. (*ganglionic accordance* or *sensation*), just as the visual impression is sent up to the brain in ordinary sight (*cerebral accordance* or *sensation*); and, finally, in both there is a mental accordance necessarily added, by which in one case we become conscious of a general want of food in the system (*hunger*), and in the other of a dimly-lighted external object. Again, as in the instance of the report of a gun, we cannot help hearing it, so it is with hunger, we cannot help attending to, or mentally recording it when there is too little liquor sanguinis in the body.



The only difference we can detect between the phenomena of the ordinary senses and those of ganglia is, that in the former, the mind perceives the object reflected directly upon the brain, but in the latter it notices the same indirectly, or doubly reflected on the cerebral centre. The mind, as it were, sees through two glasses, viz., the cerebral and the ganglionic, the former reflecting to the mental eye what the latter had already reflected. Indeed, the cæliac axis in the case of defective supply of liquor sanguinis, and the ganglionic system generally in that of full supply of the same fluid, may be compared to two object glasses, and the brain to the eye-piece of a compound microscope for the soul to record the proceedings of its empire of flesh. The order in which this reflection may be supposed to take place is as follows:—*First*, ganglionic discordance; *second*, ganglionic accordance; *third*, cerebral discordance; *fourth*, cerebral accordance; *fifth*, mental accordance of defective, full, or perverted supply of liquor of the blood. The same order of phenomena, minus those of ganglia, must occur in the spinal reflex function when performed under consciousness.

The sensation of thirst is similarly induced by a scanty supply of water in the body, causing its peculiar discordant impression on the afferent nerves. Satiety is an announcement to the ganglionic centres of the reception of a proper quantity of food in the stomach; and in the same manner the feeling of continued tone and health arises from the usual supply of blood to the different tissues. All these ganglionic accordant impressions, therefore, are to be referred to the defective or less extended contact of liquor sanguinis with the tissues on the one hand, and the full contact of food and drink with the mucous coats of the stomach on the other.

A different set of ganglionic and spinal accordances or sensations is excited from the impressions of tissues themselves, or assimilated liquor sanguinis. Thus, if the supply of blood to the organs be not duly kept up by timely digestion and proper and adequate circulation, the tissues constituting them suffer a sort of starvation, and become thin and wear

away. This wholesale famine of our frame is soon communicated to the ganglia and spinal chord, occasioning a sentient accordance in each, which might be technically called *weakness* for the ganglionic and *debility* for the spinal. The same conditions being reversed, that is, when the tissues and organs are well fed, will supply us with two opposite kinds of accordsances, which may be respectively denominated *tone*, if it be ganglionic, and simple *strength*, if spinal. The word exhaustion in that case will signify a compound sensation of temporary weakness and debility, and the term health that of continued tone and strength.

The use of some such words to indicate definitely the particular conditions of the system to which they have been restricted here, would be a great boon alike to the student and professor in the accurate conception and delineation of disease; at present it is to be doubted if the student exercises any discrimination in the use of any two such expressions as weakness and debility, tone and strength, &c.; if he does, he is still in the habit of associating them together, as if the ideas they convey necessarily recall each other. He takes for granted that if a person be weak he must be debilitated also, as a matter of course. Although these conditions often go together, yet cases are daily occurring in which each of them may be seen to exist without the other. What have we in cholera and convulsions from loss of blood? Have we not here simple weakness without debility in the muscles? Again, the contrary happens in rapid convalescence from acute disorders in which the organic functions are carried on with a vigour or tone unprecedented even during health, yet the spinal motor accordance or strength is defective, and the motions are slow, irregular, and performed with great difficulty. Further, in the growth of infancy, tone is disproportionately greater than strength, and in the middle age strength far exceeds tone.

Tone, or normal sentient ganglionic accordance, when partially increased causes hypertrophy and tumours; and the same partially decreased, that is, partial weakness, produces atrophy

of organs. *Weakness* is the fatal cause of cholera, *debility* that of convulsions, and *exhaustion* that of hydrophobia and tetanus. In like manner, excessive *tone* kills by hypertrophy and tumours, and excessive *strength* by ruptures.

Unless the distinctions such as we have above suggested be rigidly observed, it would not only be vain and profitless to prosecute rationally the study of our science, but any attempt at simplicity and accuracy of description of disease must necessarily be hopeless.

Owing to the licentiousness and confusion which so remarkably characterise the medical language now in use, our knowledge of the manner in which medical agents operate is anything but creditable. How do the tonics, antiphlogistics, stimulants, &c., act? Where does the impression of the tonic, and the consequent nervous accordance first begin? In other words, does it produce its impression on the spinal or ganglionic side of the spino-ganglionic sense. It must be obvious that the first impression of the tonic is on weakness, and not debility, which it improves by invigorating digestion, circulation, and nutrition; as the tone increases, debility gradually disappears, and strength is substituted. In the same manner, a purgative operates directly on tone, and not on strength, which is indirectly lowered. Some medicines, on the other hand, act directly on the spinal sensations, viz., debility and strength, and indirectly on weakness and tone, as narcotics, strychnine, brucine, electricity, mesmerism, &c. In these, the ganglionic or organic functions do not seem to be altered till after the spinal; other medicinal agents affect all the nervous centres, cerebral, spinal and ganglionic at the same time, as wine and diffusible stimulants generally, alterative remedies, &c. We shall have occasion to recur to this subject hereafter.\*

We have yet to analyse a third class of sensations, arising from the impressions of liquor sanguinis in its last or secretive stage, that is, after it has been assimilated or otherwise passed through the living tissues either to be thrown away as

\* See our Enquiry into Action of Medicinal Agents, entitled "Principles of Rational Therapeutics."

refuse, or formed into some natural secretion for some purpose of the economy. The impression which the liquor sanguinis in the secretive or excretive stages gives rise to, and the sensations it produces on the spinal and ganglionic centres, are of a different character to those we have hitherto recognized. When the effete liquor of the blood is duly eliminated by the processes of secretion and excretion, as in ordinary health, it engenders the feelings of corporeal ease, freedom and cheerfulness, but if it be retained and perverted as in the suppression of urine and bile, dried up secretions in fevers, &c., it causes dulness, a sense of weight and oppression, giddiness, various disturbances of the senses, langour, lassitude, coma, &c. Of all these and other symptoms of retained and perverted liquor sanguinis in its effete state, however, there are two which not only pervade the whole body, but seem invariably to arise from, and accompany suppressed and abnormal secretions, and excretions, viz., langour and lassitude. *Langour* and *lassitude* are, in short, strictly speaking, two organic concordances, the former ganglionic and the latter spinal, created by the incessant discordant impression of retained liquor sanguinis in its excretive state on the one hand, and the continued spino-ganglionic sentient impressions or accordances that follow, on the other. They are, in fact, the analogues of *tone* and *strength*, *weakness* and *debility*, or hunger and satiety of the two first stages of liquor sanguinis. In other words, as we derive hunger and contentment from the impressions of the first or *primitive* or *native stage* of liquor sanguinis, and tone and strength, weakness and debility from those of *its assimilated state*, so do we obtain langour and lassitude from the impressions of the same fluid pabulum of support in its last or *secretive* or *excretive stage*.

Every serious thinking and conscientious medical man must acknowledge the great advantage of our possessing a uniform, systematic nomenclature composed of clear and well defined expressions, which need, we repeat, is at present a great desideratum as regards medicine. We cannot, therefore, too strongly recommend the universal adoption of the



words, *tone* and *strength*, *weakness* and *debility*, *langour* and *lassitude*, in the sense they have been used in this book. Now-a-days we are using them almost at random, confounding one term with the other, as *tone* with *strength*, *weakness* with *debility*, and so on, and *vice versa*. What does the student care about what is *langour* and what is *lassitude*? What signifies to him if the one term means one thing and the other another, provided the words, empty and confused as they are, are in his convenient and easy-going memory? Where, however, life and death are concerned, we should be pertinaciously wary and careful about what we say and do. We weigh every medicine by grains and drops. Why should we not measure disease in the same way, by the scale of a correct language, and the weights and minim measures of well defined words. There are limits to all our structures and functions in health and disease; and we have only to draw those limits in the map of life and pathology by the black-lead pencil of language. In the absence of such boundaries, no description of disease can ever be perfect or approach to the prototype; all we can effect is to paint a deformed or gaudy, but false picture, which does more to bewilder than teach or enlighten our faculties.

The remedial measures for the spino-ganglionic derangements, when excessive, as too much *tone* and *strength*, local or general, are antiphlogistics and sedatives; when defective, as *weakness* and *debility*, stimulants and tonics or stimulant tonics; and when perverted, as in *langour* and *lassitude*, alteratives. A mixed method is to be followed where several of these conditions exist altogether, as in fevers.

#### *A few Observations on the Nature of Remedies.*

Much has been said and written with respect to the nature and action of medicines: a slight reference to the laws of the animal economy, however, would have saved us from a world of useless discussion. Some may ask why a certain remedy should particularly tend to excite one part or



surface of the body in preference to another? Why should diaphoretics act more especially on the skin, purgatives on the intestines, while tonics and alteratives operate on the system generally? These questions are as puerile as useless. We do not usually trouble ourselves by enquiries such as, why sweat is the invariable secretion of the skin, mucus of mucous membrane, urine of the kidneys, &c. Every secretion or function may be said to be excited by its peculiar stimulus or stimuli, which are either internal and natural, or external and foreign. Thus, the secretion of urine under ordinary circumstances is occasioned by its usual stimuli—a due quantity of urea and the salts of urine, but in disease the same end cannot be gained without the additional stimulation of diuretics, which are unnatural and external agents. The same holds with other secretions and functions. Nature wants to get rid of some substances formed within the animal, as urea, ingredients of sweat, urinary salts, &c., or introduced into its habit from without as diuretics, diaphoretics, &c., with as much ease and convenience as she can, by excreting organs. It is for her convenience alone that she ordains that such and such matters of which she has no need, should tend to and be expelled from such and such surfaces only under certain conditions. It is therefore in vain that we seek to go further than the fact that certain medicines in certain doses cause their peculiar effects in definite situations and structures. If everything which nature wants to throw out were to be passed by the same channel, it is superfluous to say that life complicated as ours could not be maintained for a second, hence the reason that medicinal agents which generally require to be excreted in some form or other, are some diaphoretics, some purgatives, some diuretics, &c.

Much will, however, depend on the compatibility or incompatibility of the substances we use as remedies with the animal mechanism. Thus, when we use a very small dose of a purgative medicine, there is scarcely sufficient irritation to unload the bowels, and the purgative may be allowed to enter the body and pass through any other channel or chan-

nels of secretion, according as it is more compatible with the composition of the fluid of urine, sweat, bile, mucus, &c., or with all those substances indifferently. All medicines in this respect may be said to act alike, and differ only as to how they pass out or exhaust themselves in the system, which difference will greatly depend on the quantity of their dose and their chemical affinity, by which they either suffer decomposition, or enter into new combinations within the body.

Their mildest action is that of an alterative, which enters the frame and has its exit without any immediate obvious display of its virtues; for instance, when we take a hundredth part of a grain of opium, a drop of wine, or a grain of jalap. This alterative influence is slow and general, and the medicine used for this purpose may find its way out again indifferently through any particular organ, or modified and changed, through many organs at the same time. Mercury, iodine, and arsenic are some of our potential alterative tonics which improve tone and strength, and appear to act in the same slow unconscious mood. However, when the dose is increased, or the medicine produces a powerful impression, and cannot be slowly, conveniently, and softly carried through the whole system without serious damage to its stability, nature tries to drive it out as quickly as it can by setting up determination or congestion such as the state of the body would allow at the time in some secreting or excreting organ, so that we may have sweating, secretion of urine, bile, mucus, or watery fluids, &c., and with them the expulsion of the offending drug. Mercury, which is an alterative in small doses, becomes a chologogue and sialogogue from excessive employment; diuretics, diaphoretics, and purgatives act in the same manner.

The dose being still further raised, the remedial agent would prove irritant, caustic, or sedative, as when there is a large quantity of turpentine, an emetic and some poison in the stomach, or an overdose of calomel, &c. It must here be evident that the same medicines which were hitherto alteratives, tonics, purgatives, diaphoretics, and diuretics, in small

quantities, are now become rank poisons, sedatives, emetics, and irritants.

There are some substances which, from the rapidity of their action, and the consequent universal and direct impression on the nervous centres, affect the whole body before preparations could be made for their elimination. These are the general sedatives, stimulants, and narcotics.

*A few Words on the State of the Humours in Disease.*

The chief humours of the body are the blood, chyle, and lymph, each of which consists, naturally, of some solid particles and a fluid, the former as the red and pale corpuscles, the molecular base, and oil globules, and the latter as the liquor sanguinis, the fluid portion of chyle, and of lymph. All these solid and liquid constituents are liable to be altered in disease relatively and absolutely, both as respects their quantity and quality. Thus the chyle exhibits an extremely white appearance after digestion of a rich fatty meal, owing to an excess of oil globules, and the blood assumes a vermilion colour from superabundance of red particles in hyperæmia. The opposite states happen after a scanty, poor meal, and in anemia, where the solid ingredients are absolutely and relatively less. The red particles of blood become not only excessive in productive determination, as pleuritis, phrenitis, &c., and defective in dropsy, cholera, diabetes, &c., but also perverted, as in scorbutus and malignant fevers, &c. Again, with respect to liquor sanguinis, it may exceed its natural quantity in one, and fall short of it in another disease, the former causing hyperæmia and the latter anæmia. When it is perverted it induces oligæmia, as in plague, cholera, typhus fever, &c. The liquor sanguinis may also suffer from disturbance of the healthy ratio of its proximate elements; it may be more watery, as in the incipient stage of dropsy, or too thick, as in cholera. There may be more saline matter, as perhaps in sea scurvy, or loss of it, as in cholera and West Indian fevers. The albumen is excessive in some cases, as in

productive determination and active plethora, and defective in others, as in albuminuria and the watery blood of chlorosis. In the same manner fibrine is too abundant in determination, and scanty in dropsy, indigestion, anæmia, &c.

Before concluding these remarks we may here notice briefly some of the disorders of secretions and excretions. The principal secretions are the salivary, gastric, hepatic, intestinal or mucous, and serous; and the excretions are the urinary, cutaneous, and mammary. As these two functions are carried on in the same manner, and by the same agents, it is not necessary to describe them under two separate heads. We shall consider them all as secretions. They may be defined as the distillation of a portion of the serum of liquor sanguinis, with some matter to be removed for some purpose in the economy, or got rid of through the extravascular tissue of some kind of epithelium. Of all the tissues of animals, the epithelium is perhaps the most extensive and important; in fact, we cannot point out a secreting surface without the investment of an epithelial coat, which seems to be essential to the production of a secretion.

Epithelial cells are not only endowed with the power of imbibition, but they convert the imbibed fluids into the standards of secretions. The epithelium consists entirely of cells of various figures, some globular, some flat, others tessellated and columnar, containing nuclei, and some are armed with cilia. The cells, besides nuclei, contain some amorphous matter, and are found in single or several layers in various stages of change and growth.

They live independently of the nerves and blood-vessels upon effused liquor sanguinis or plasma of the blood. Besides their taking, as we are assured, a chief share in the formation of the secretions, they serve other most important purposes in our economy; they cover and protect surfaces from injurious contact of extraneous bodies; they are the medium of absorption of various fluids, such as water from the skin, chyle from the intestines, &c., and those endowed with cilia produce constant currents for the expulsion of effete

matter. It is, therefore, not improbable that in many cases an abnormal state of the epithelial membrane is an immediate cause of disorder to the secretive functions. Many of the skin diseases attended with scaling, which sometimes baffle the best conducted treatment, are in reality instances of epithelial disorder.

The diseased secretions may be excessive, defective, and perverted—*excessive* in profuse diuresis, diabetes, sweating of hectic fever, pyrosis, bronchorrhœa, diarrhœa, salivation, purging, albuminuria, dropsy; *defective* as in dryness of the skin, parched state of the mouth and throat, constipation, black stools from deficiency of bile, diminution of the secretion of urine in fever and productive determinations; and, lastly, *perverted*, as in clammy and stinking perspiration, sordes and foul tongue, stools of diarrhœa and dysentery, unnatural colour, density, and specific gravity of urine, black stool of typhus, &c.



## CHAPTER XVI.

## SPIRITUAL SENSE.

THE two senses, viz., muscular and nervous, of which we have given a hasty sketch in the foregoing pages, are subservient to the maintenance and support of the animal man; but the spiritual sense takes cognizance of him in all his native independence of thought, reason, and moral faculty. It therefore comprises those faculties or senses which by composition form the mind, and by which the soul is made aware of its own being and operations, and also of those without itself, as of the external world, God, &c. It is the region of personality, of the Me and ourselves, the medium of our intercourse with the universe, and thus the medium alone through which to attain to the knowledge of the Divine Being. It is, so to speak, a record office both of our obligations and duties and how the same are fulfilled in this world, to be laid before the throne of the Most High in the hereafter.

For practical purposes we shall recognize four spiritual senses or powers, viz., the *perceptive* or intelligence, *conceptive* or reflection, *discriminative* or reason, and lastly, the *regenerative* or morality, or moral sense. These senses are liable to undergo degeneration and decay in disease, and may be discordant, accordant, and concordant, as in the case of the nervous sense, in consequence of the immediate control of the soul. Thus, sometimes, although we may be doing nothing, still we are aware of our full possession of these faculties, for we know we can understand, reflect, and reason, and distinguish right from wrong; but nevertheless it is also a positive fact that we cannot tell to what extent we can go through these several mental processes. Naturally, therefore, these mental powers

are without any fixed proportion or limit, which is characteristic of discordance. Their accordance may be observed in the acts of perceiving, reflecting, reasoning, and separating good from evil. In each of these processes the soul is working in concert with the objects or facts furnished to it or elicited by our intelligence, reflections, &c.; and we can here give the exact amount of our thought, reflection, discrimination, &c., and tell with precision from what point we had begun, and where we stop or intend to stop. The accordance and discordance combined and repeated, as in the ordinary mental phenomena, produce spiritual concordances or habits of perception, reflection, reasoning, and moral judgment; as we find in the ease with which we notice certain things without necessarily entering into their details, which we had often perceived before; in the facility of penetration in men of deep thought, the rapid decision of the experienced physician and judge, religious devotion, and enthusiasm, &c.

The spiritual accordances and concordances may become *excessive*, *defective*, and *perverted* in disease; excessive intellectual accordance is manifest in the undue pain with which a maniac sees, hears, smells, or tastes certain objects; too much interest in any sensible thing, madness of love, mania for enhancing personal charms by novel dress, &c. Men suffering from these affections may be called intellectual monomaniacs. These cases are accompanied with defective intellectual sense with regard to other things which the mind, from excessive partiality to some object, fails to take due notice of. Intelligence is also deficient in coma and concussion. Intelligence is perverted in delirium in which the patient takes, as it were, things for granted; hence the frightful visions of ghosts and demons. The purely intellectual maniac, without reason or other corrective powers of the mind, also affords a specimen of concordant intelligence in disease.

Reflective accordance becomes excessive in some maniacs who exist no longer in the external world, but exhibit themselves through the mazes of some solitary idea in the memory,

in painfully recalling the past in a person in disgrace, incipient repentance, &c.; it is defective in fatuity, confusion of mind, coma, &c., and perverted in confirmed madness, dreaming of wild trains of thought, &c.; many of these cases, in their persistency, are at the same time instances of diseased concordance.

Rational accordance is morbidly *increased* in extreme caution, scrutiny, and scepticism; *decreased* in imbecility and fatuity, and *perverted* in erroneous judgments. Rational concordance is seen in conviction, confidence, reasonable hope &c.

In the same manner moral accordance, *excessive*, is instanced in moral faith, religious enthusiasm, or moral monomania, hope of false religion, &c.; *defective* in imbecility, ungodliness, sinfulness; and lastly, *perverted* in fanaticism, heretic tendency, idolatry, materialism, &c.

The student will now perceive that we have arrived at the conclusion of our imperfect analysis of the state of the sick into its primary and proximate elements; the former as the various conditions of the muscular, nervous, and spiritual sense we have examined, and the latter as determination and congestion, *simple* and *productive*. To complete the cognizant pathology we would now propose to combine these elements into wholes, or diseases of the body as they are actually met with in nature. But before we can do so to the clear comprehension of the student it would be necessary to take a general survey of the nature, definition, and the modes of diagnosis and prognosis of the ordinary or cognizant diseases; the utility of such a course will be appreciated in the sequel. We shall, however, first of all make in this place a few general observations on the nature and characteristics of fever.

## CHAPTER XVII.

## FEVER.

By discarding inflammation, we have brought nearly nine-tenths of the known diseases under the standard of determination and congestion: we have still, however, this tenth at least to reduce to some common subjection. There are some disorders which are purely nervous and muscular, as angina pectoris, sciatica, hydrophobia, tetanus, &c., which in many instances we fail to trace to congestion and determination. Their phenomena are totally different from those of dilatation and contraction of vessels and the products which these vessels tend to yield. It is no use therefore to send an army of absurd reasoning and theories in order to endeavour to subdue these our border enemy.

The abnormal growths, such as tumours, cancer, &c., worms and other parasites, are supported and fed by the liberal determination and supply of animal juices at the expense of the system, and when they do us any harm it is by the help of the same treacherous dilatation of vessels. They can likewise in the latter circumstances be mustered under the head of determination and congestion. What disorders are they then with whose nature we are still unacquainted, and which refuse to acknowledge their consanguinity with determination and congestion? Certainly they must be the ordinary and eruptive fevers, including plague. They are not like those diseased conditions we have hitherto observed, confined to particular parts or organs, but extend over the whole frame, so that every cell and fibre, and fluid and solid, equally suffer.

Now what is the nature of these general affections? In fact, what is fever? There is scarcely any subject in the whole circuit of the medical science which has attracted such lavish attention from writers as fever, and perhaps justly, for

by far the greater part of our mortality is to be attributed to this source. It is to them, the king of all diseases, and they heartily render the allegiance due to royalty. They have spared no language to delineate this malady, and no ingenuity to unravel its deep mysteries. Theories, apparently the most plausible, at the same time the most contradictory, have been announced and advocated with a zeal and authority which did not fail to get crowds of admirers and converts. New schools have arisen to uphold and inculcate new sentiments, and to overthrow those previously in vogue. Others have followed these only to meet the fate of their predecessors, and this would perhaps go on to the end of all time. Every theory launched had its particular hobby on which it rode and triumphed, until it was upset by a fresh vision of a more glittering exterior.

It would take us more space than we can afford to collect together this vast heap of opinions of authors on fever; all we can do is to mention a few of the most prominent of them, which have still their sway over the masses of our profession.

It was maintained by Dr. Cullen that the depression of the nervous system is the first event in fever, which depression gives rise to spasm of the extreme capillaries, and that the subsequent reaction, and the effects incidental to it, are an attempt of nature to overcome spasm.

This view, as we shall hereafter see, although yet in its germ, is the soundest of all that have preceded or followed it.

The humeralists, as Dr. Steven, are of opinion that fever consists of certain changes in the blood incompatible with health.

There are two other schools, one advocating that fever is a primary, and the other that it is a secondary disease. The essentialists adduce many facts to prove that it is an idiopathic affection, but those who dissent from them, with an equal pertinacity and semblance of proof, maintain that it is nothing more than a consequence of some inflammation. The French pathologists are the originators and chief supporters of the latter doctrine.



For ourselves we see nothing to startle us, or anything strange or absurd in these various opinions ; they are founded on well-established facts, and hold good as far as they go. Their common fault, however, is that they are simply too partial, and apply to only a limited number of cases. They pretend to more than they explain, and to be generally guided by any one of them is like one trying to know the moon by seeing it only once in one of its numerous phases. The framers of theories would have done an immortal service to the cause of humanity if in place of their useless contentions and inglorious warfare they had devoted themselves to the noble work of peace and reconciliation. In order to open the eyes of theorists to more comprehensive views, it is advisable that we should at the outset lay before them the leading facts of a case of fever.

Fever may be divided into two stages, viz., the forming or cold stage, and the confirmed or hot stage. The cold stage is usually ushered in with a feeling of languor and lassitude, great feebleness, or a sense of weakness and debility, loss of appetite, and sickness or vomiting. These are soon followed by chilliness, shivering, paleness of the surface, cutis anserina, and a rapid contracted pulse. In the hot stage the cold feelings are gradually succeeded by a sense of heat within and without. The skin becomes dry, hot, and flushed ; pulse hard, full, bounding, and frequent ; tongue parched and furred, thirst excessive, bowels costive, and the secretions generally scanty or dried up and perverted. To these symptoms are to be added the exaltation of the ordinary senses, as the acute sensibility of the skin, intolerance of light, sound, &c. Such are the usual criteria of a common attack of fever. Let us now see what these several symptoms interpret in each stage of fever, with regard to the state of the nervous and vascular systems.

The sensations *chilliness*, *langour*, *lassitude*, *weakness*, and *debility* indicate defective sentient accordances of the spinal chord, and ganglia, which soon excite two corresponding perverted motor ones of the same two axes of nerves, of which the spinal is evidenced by the *trembling* which succeeds chil-

liness, and the ganglionic in the *spasm* of the *capillaries* of the skin (*eutis anserina*), and of *secreting* and *excreting surfaces generally*; hence the *dryness of all secretions*. It may be here asked how *languor* and *lassitude*, *weakness* and *debility* should all present themselves in fever. To understand this point we must take into consideration the condition of the liquor sanguinis in that disease.

It is agreed on all hands that the blood in idiopathic fever is more or less undermined in its constitution by the presence of some poison in it (malaria, poison of small-pox, &c.), it is no longer fit for healthy nutrition, and the impressions and sensations it then creates must therefore be of a different nature to those we are accustomed to in health. Hence it is that the liquor sanguinis in its three stages, viz., *of contact with tissues*, *of assimilation*, and *of secretion*, instead of engendering the *feelings of ease* and *contentment*, *tone* and *strength*, and *bodily cheerfulness* and *activity*, as in health, causes correspondingly those of *uneasiness* and *soreness*, of *weakness* and *debility*, and of *languor* and *lassitude* (*spino-ganglionic accordances*).

Again, we do not doubt the shaking of fever, nor the cutis anserina, nor the general defect of secretions. The shaking proceeds unquestionably from perverted motor accordance of the spinal chord, and to account for the paleness and shrinking of the skin, and the general want of secretions, we must appeal to spasm of the minute capillaries of the cutis and of the secreting and excreting surfaces. The capillaries being in spasm, or more contracted than usual, there must be less blood moving through them, and less blood moving through unusually contracted vessels must necessarily give rise to defective secretion. The corrugation must in the same way be attributed to spasm of the cutaneous capillaries (*motor ganglionic accordance*). The skin we know contracts and shrinks from the impression of cold, and yet it is not endowed with muscular or contractile fibres. How is this fact then to be explained? Is it not more probable that the contraction of the skin is occasioned by spasm of the cutaneous capilla-

ries? Are we to wait on the vainly expected discovery of muscular fibres in the skin for the interpretation of a simple phenomenon which we daily observe?

When the whole surface of the body is affected with spasm, and shrunk and crisped up, it must necessarily squeeze out the greater part of its blood into the internal organs; the intropulsion is largest in organs having a loose structure, as the lungs, especially the spleen, owing to its great natural expansibility and its comparative insignificance to organic life; the action of the heart is consequently embarrassed, hence the pulse is contracted and quick in the cold stage.

As regards the condition of the vascular system, therefore, we may describe the cold stage of fever as a compound of spasm of the capillaries of the skin, and of the secreting surfaces of many of the internal organs, and distention with too much blood of other vessels of the same organs (internal), with insufficient action of the heart. In other words, if the cold stage of fever means anything, it is undoubtedly *a simple general congestion* (dilatation of vessels with too much blood and less motion of that blood) *of the internal organs and other internal parts, induced by spasm of the skin, and secreting and excreting surfaces generally* (natural outlets of effete matter).

Let us now analyse the hot stage, or the developed fever. There is increased heat of skin, full, hard, and bounding pulse, great throbbing of the carotids, headache, &c., showing not only that the heart is now acting with more than its accustomed vigour, and that there is more blood flowing through the skin; but that the spasm, which characterised the state of the surface in the cold stage, must have to a great extent given way to dilatation to allow the superabundant blood now circulating through it to pass with ease. We have the mouth still continuing dry, and all the natural secretions and excretions as scanty as in the cold stage. We therefore reasonably infer that the same cause which checked the secretions in the first stage of fever exists also in the hot stage, viz., the concordant spasm of the capillaries of the

secreting surfaces (*mucous membranes*, sweat-ducts, &c.). These enduring spasms not only render the secretions defective, but are the principal agents in keeping up the febrile phenomena afterwards, viz., the general congestion and determination, the former chiefly in the internal organs, and the latter in the skin. The nervous phenomena present nearly the same characteristics in the hot as in the cold stage, excepting where the latter is now superseded by determination, as in the skin and the senses. We have here the same uneasy feelings, the same general weakness and debility, the same languor and lassitude, &c. The reason of this is, that the liquor sanguinis, which is the cause of these sensations, exists in the same poisoned state in both the stages of fever.

It may be asked how can congestion be or exist at the same time with determination in which the heart acts with violence; for congestion requires that the *vis-a-tergo* should be defective? To this we answer that when the *vis-a-tergo*, however increased, can be conveniently expended in some part, it is generally observed that another may easily escape from its disturbance. Thus, it often happens that the same person suffering from a congestive disease in some one organ is suddenly destroyed by a determination elsewhere, without the former affection being interfered with in any way; for example, an individual while labouring under diarrhoea or gleet, may perish from acute phrenitis, violent determination from compound fracture, &c., without either the diarrhoea or gleet partaking of the increased action of the heart in the slightest degree. Further, a scrofulous person with intractable slow healing ulcers, may be frequently seen to make a favourable union by the first intention of fractured bones. It is therefore perfectly compatible for determination in the skin to accompany congestion in the internal organs.

The reason of determination in the skin being invariably present in fever is, that a great many of the internal organs are so formed and bound up by their investing membranes, that they can only admit of a certain degree of tension, and consequently, they offer more or less resistance to the dilating

efforts of the heart ; this resistance however is entirely wanting in the case of the skin, which is surrounded by the loose elastic air, and naturally possesses great extensibility.

The hot stage of fever then, in whatever way it may be viewed or described, is a combination of determination and congestion, and spasm, the latter being the enduring cause of the two former. Remove the spasm of the secreting surfaces of the internal organs by opening out their secretions, and by indirectly killing the fever poison or cause, and the fever, which is generally a compound of determination and congestion, will necessarily subside, unless the so-called fever has had time to produce direful changes on functions and structures on which life is dependent. The spasm may also give way in the course of the disease ; but once the enemy has a proper hold of the system the internal organs will still remain in a state of congestion. Fever, therefore, strictly speaking, is partly congestion and partly determination, originally induced by spasm of capillaries. It may be sometimes purely determination, as the fever from compound fracture, or purely congestion, as the last stage of typhus, or compound of determination and congestion, as the generality of idiopathic fevers. Again, in the same case there may be more determination than congestion, as in synocha,\* or more congestion than determination, as in synochus\* and the first stage of typhus. The continuance, intermissions and remissions of fever are likewise due to the general cause of determination and congestion, viz., spasms of the capillaries. Thus, when the spasm is current, fever continues without any mitigation or subsidence of its symptoms, and becomes what is called the continued fever. When, however, the spasm is concurrent, that is, it partially disappears and is renewed again with vigour after some interval, the fever which is then produced is of the remittent type ; and lastly, when the spasm is recurrent, that is, that it leaves the patient altogether for a time, and then comes on with a fresh attack, the resulting fever must be an intermittent.

\* These terms are adopted from Cullen, and used in his sense.



The view we have here adopted with respect to the nature of fever, viz., that it is essentially a combination of determination and congestion will enable us to explain all the known phenomena preceding, accompanying, and succeeding that disease. It would also give us the means of not only confirming the truth, so far as there is any, of the diverse opinions and observations of the past and living authors, but of reconciling their apparently contradictory statements. And when we have fulfilled this task we shall ask our professional brethren if they are prepared to cast into eternal oblivion another great bugbear in medicine, and an illusion still more frightful than inflammation, viz., fever; at any rate they will then be able to judge for themselves whether to retain or discard for ever a term which has no meaning in science, and to say the least, has been a labyrinth of confusion in all ages.

We need not here explain the manner in which the transition of simple congestion and determination to their productive stages is effected, and how one of these two conditions of vessels may be changed into the other by the increase or decrease of *vis-a-tergo* or the motion of blood in dilated vessels. These processes and changes have already been dwelt upon in their proper places, and which the student cannot have so soon forgotten. If fever consists of determination and congestion, we should naturally expect in the febrile action all the stages and consequences of those two forms of dilated vessels. Are the congestion and determination of fever occasionally, or always productive. There can be no doubt that there are instances of *simple* local congestion and determination unfettered with products. We have daily examples of *simple* local congestion and determination. Why do not the same happen when they are general and more extended? Is there any fact to show that because a certain diseased state exists in one part, that therefore it cannot extend to other parts at the same time? Either we must maintain such absurdities, or faithfully submit to the essentialists who affirm that fever is a primary disease. Let the

non-essentialists then accede to the doctrine that primary idiopathic fever is not only possible but actually occurs in nature.

Congestion and determination of fever however are sometimes overloaded with products, as fever complicated with phrenitis, ophthalmia, bronchitis, pneumonia, carditis, hepatitis, gastritis, enteritis, diarrhœa, dysentery, dothenteritis, nephritis, &c. We have proved elsewhere how the dilated vessels in intense determination and congestion are disposed to throw out lymph and secrete pus, block up, and die. That the same takes place in fever which consists of the identical conditions of tubes we cannot on any grounds dispute. In cases where complications are met with, have we or have we not congestion or determination violent enough to cause those super-added mischiefs? If the vessels are not in the same condition in some particular organ in fever as in ordinary productive determination, &c., how are we to account for similar products of the secondary affections of that disease? Surely, the hepatitis in fever is a productive determination, and a part of the general determination of that affection. The same thing may be said of all secondary diseases and sequellæ. Fevers do not usually set in with a *productive* but a *simple* determination and congestion, which subsequently either terminates in resolution and subsidence of the fever, or runs into their dangerous periods of production. Indeed, production is as unnecessary to the general as to the partial determination and congestion, and consequently there may be general determination and congestion (fever) with or without products.

As the general determination and congestion, being intense in some organs, become accumulative and productive, so when the same states of vessels are local, by intensity, they may spread their influence throughout the system, constituting the inflammatory fever. Between the ordinary and the inflammatory fevers there is this difference, that the former are excited by causes which act on the whole body at once, as malaria, small-pox poison, that of typhus, &c., and that

the latter are caused by agents having a limited seat of operation in the first instance, as in fractures, wounds, ordinary hepatitis, &c. The exciting causes can modify the intensity and the minor details of fever, but not its fundamental nature which in every case is the same.

These considerations will suffice to satisfy every one that although determination and congestion of fever are in many instances simple throughout the course of the disease, yet they have a strong tendency to be productive, and *do* become so in numerous cases. It is here that we find fault with the absolute essentialists. While they view the harmless inoffensive part of the febrile action with the clearness of daylight, they overlook, in a great measure, its productive side in the darkness of their partialism. The non-essentialists, on the other hand, confine themselves too much to the question of production, which may or may not take place, and consider the essential parts of the disease, viz., determination and congestion, as mere appendages. They are both in error, both open to blame; let both make up their differences.

We have to say a few words to the humoralists. These speculators maintain that some decomposition or change in the blood is the chief element of fever; but we cannot look upon it more than as a mere cause, and as such we do not believe that it constitutes any part of the real disease, viz., dilatation of vessels with more or less *vis-a-tergo*. We may recognize two kinds of causes of fever, viz., the tangible and intangible; the former, such as heat, cold, fractures, wounds, &c., and the latter, as poisons, malaria, infectious agents, &c. The intangible causes operate on all the parts of the body equally, its solids and its fluids at the same time; but the tangible act on limited surfaces.

The ordinary fevers for this reason may be called malarial or infectious fevers, in contradistinction to the inflammatory, or fevers excited by local productive determinations and congestions, as hepatitis, pneumonia, &c., these diseases being often produced by tangible agents.

We do not question that in malarial or infectious fevers,

the humours, especially the blood, undergo several changes, as may be inferred from the perverted condition of the secretions, and the state of the blood when drawn, as to its colour, consistency, diminution, or increase of some of its constituent principles, &c. But we view these changes, as we said before, as causes of fevers and not fever itself. We may have blood in a degraded state without determination and congestion, and these two processes without necessarily impure blood. The humoralist draws his conclusions not so much from the progress of the disease as from where the latter takes its origin. He scarcely touches upon the nature of fever, and speaks of it as one describes a house from a mere slight outside view, without entering into it to examine its construction and internal arrangements. He certainly offers us a few practical hints, and we so far acknowledge the merit of his system. However, even the partial suggestions he makes would be of little use to us until we have thoroughly acquainted ourselves with the actual enemy. For instance, according to Dr. Stevens, there is a deficiency of saline matter in the blood in the fevers he describes, and we, to make it good, ought to administer salines. We can, however, use saline draughts *ad infinitum*, but we shall make no great impression on the disease, unless we add to these those measures usually had recourse to to remove determination and congestion. Humoralism, therefore, is purely a doctrine of causes, and we have no more to do with it than we have to do with the fall of a person who thereby broke his leg.

We have found no difference between the determination and congestion of fever and those of common cases, such as hepatitis, peritonitis, pleuritis, &c., as regards their products; it remains now to see if they agree in their symptoms. The characteristic symptoms of a local productive determination (inflammation), are heat, redness, pain, and swelling. Redness and heat are observable in the flushed skin, and increased temperature of the hot stage of fever. Where, however, is the pain and swelling of the skin in which the de-

termination of inflammation is so marked? In the generality of fevers, these two symptoms, it is true, are absent in consequence of the great natural extensibility and elasticity of the cutaneous surface, and therefore the little resistance the latter offers to the swell or wave of determination. But when the determination is carried to an unusual extent, so that the tubes already relaxed are not sufficient to arrest and accommodate the further progress of the disease, and there are no more spare vessels to dilate, as in the eruptive fevers, extensive burns, &c., the case is immediately reversed, and we have not only heat and redness, but also the characteristic pain and swelling.

As a further proof of the identity of fever with common determination and congestion, we may adduce the sameness of the general principles of treatment adopted in each. Fever being an extended determination and congestion, or, say, a boil in an enlarged form, requires a more general treatment than the limited phlegmon. Instead of poultices, fomentations, and local application of cold, it may be, we use the general warm or cold bath in fever. In place of bleeding by leeches, we seek the aid of the lancet. We employ purgatives, tonics, narcotics, and alteratives in both, and under the same indications. Where the boil is blind, or the urethral determination is becoming gleet, we administer stimulants, as we do in typhus. We have recourse to mercurials, diaphoretics, diuretics, tartar emetic, digitalis, &c., in fever as well as in phrenitis, pneumonia, nephritis, &c., and to serve the same ends. Fever is, then, undoubtedly, a determination of the skin combined with some congestion of the internal organs, or congestion principally, as in the last stage of typhus.

The identity of fever with the common boil, enteritis, hepatitis, &c., being thus established on indisputable grounds, we can no longer wonder at the interminable contentions of authors on the subject, and the confusion and error under which they still labour. Comparing fever to a tree, some may be said to have viewed it from its roots, as the humor-alists; some from its trunk, as the absolute essentialists; and



others from the flowers and fruits, as the non-essentialists. Determination and congestion, like a brother and sister, or a republic of brothers and sisters, form a very extensive family, whose numerous members may be described as now and then invading either single villages, as boils ; or large districts, as hepatitis, carditis, phrenitis, &c., and sometimes a whole country, levying black mail, and spreading all the horrors of desolation and death, as fevers, plague, general rheumatism, cholera, &c. The boil, the phrenitis, and the fever are not essentially different diseases, but the same affection under different names, in consequence of its various destinations and extent, viz., portions of skin and cellular tissue, the brain, and the whole body. Fever being, therefore, the determination and congestion of the whole frame (Kyâ\*), we may, by analogy, denominate it Kyâitis,\* just as the same conditions of vessels in the liver, are called hepatitis ; in the heart, carditis ; in the intestines, enteritis ; in the kidneys, nephritis, &c.

Although we thus add a term to nosology, we feel compelled to denounce the medical language now in use as a perfect tautology throughout, and medicine, as far as its nomenclature is concerned, is a science of mere nominalism. It is impossible to point out a dozen words which have any reference to the phenomena they are intended to interpret, and to learn which we are often obliged to employ other resources. What do the terms hepatitis, carditis, phrenitis, &c., convey, beyond that there is something, some mystery in the liver, heart, and brain ; not a symptom of the disease is touched upon, not a phenomenon explained, and the whole remains a blank to be filled up by other means. Indeed, we may say we have not a single measured or truly descriptive term to boast of. Have we got any such definite phrases or words as the protoxide of hydrogen of the chemist, the viola odorata of the botanist, and the articulata of the zoologist. Are inflammation, fever, irritation, weakness, and debility, languor, and lassitude, &c., as they are now used, as expressive terms, as bichloride of mercury, cathartocarpus fistula, &c ?

\* From Sanscrit, *Kyâ*, body, the whole body.

The sooner therefore we discard altogether the present medical tautology, the better for medicine and humanity. Inflammation, fever, &c., are blank and empty expressions, scarcely containing so much as a bubble does. And all our confusions, hallucinations, and ignorance, are to be attributable to those two dumb and meaningless names; and it is also owing to them that medicine has been kept so much in the background of the collateral sciences. We are continually borrowing facts from chemistry, zoology, and botany, and other sources, more to feed, as it were, and worship those blank dummies than to advance our real knowledge of disease. Suppose we substituted for hepatitis, carditis, gastritis, &c., such phrases as hepatic dirt, cardiac dregs, and gastric hodge-podge, would it have signified anything with regard to the actual disease or phenomena described under those headings. Again, while there are some words which mean nothing, as fever and inflammation, there are others which are not only most stupid, but perfect contradictions in themselves, such as congestive fever, inflammatory fever. We have seen before, that fever, if made to mean anything, is a combination of congestion and determination, or almost of congestion alone, as in the last stage of typhus; if so, how stupid it would be to say congestive congestion, or determinative determination.

The vanity and absurdity of the present medical language may be further exposed by directing our attention to the lavish superfluity of names used for the same disease. We have seen before what an extensive range the family of determination and congestion have, from the minutest pimple to the royal *kyâitis*. There is an unquestionable family likeness among them all—the boil, the hepatitis, the fever, &c., and they are all of the same stock and blood, yet they are described and known by different names, because of the difference of their position and extent, as if the determination and congestion were no longer the same states of blood vessels, and nerves, but changed into other complaints; so that the Thomas, of London, has been metamorphosed into Elias, when in Paris: and the identical Thomas, of London,

now the Elias of Paris, is afterwards converted into Kylas, of Calcutta. The phrases, corporeal, hepatic, cardiac, &c., determination and congestion, would be far preferable to *kyâitis*, hepatitis, carditis, &c.

The foregoing observations will suffice to convince any impartial reasoner of the incompetency and worthlessness, not to mention the stupidity and uncertainty, of the professional language now in vogue, and also of the urgent necessity there is of composing a new one on a scientific basis. With a view to found a nomenclature of this kind, we have presumed, as our readers are aware, to make use in this treatise of the following words and phrases, as expressive of the phenomena they each represent:—*Muscular resident sense; cognizance, and recognition; existent, partially co-existent, and completely co-existent spasms, and motions; excessive, defective, and perverted; simple and productive determination and congestion; general determination and congestion (kyâitis); the same local (boil); current, recurrent, and concurrent; nervous sense, discordance, accordance, and concordance; the same sentient and motor; spino-ganglionic, or organic sense; languor and lassitude; weakness and debility; and tone and strength; spiritual sense; perception, conception, reason, and moral sense; alimentation, realimentation, nervous, or super-realimentation, and spiritual alimentation.*

We shall now point out how the fevers are to be arranged under their new designation, *kyâitis*. They may be conveniently divided into three principal groups, according to the nature of the spasm present, viz., those of *current spasm*, or *current kyâitis*; those of *recurrent spasm*, or *recurrent kyâitis*; and lastly, those of *concurrent spasm*, or *concurrent kyâitis*. The current *kyâitis* will, therefore, comprise the continued and eruptive fevers, in which the spasm continues for days together without any marked relaxation. The concurrent *kyâitis* in the same manner will include the yellow and the common remittent fevers, characterised by the spasm giving way partially in some parts, and then being renewed or reinforced; and lastly, the recurrent *kyâitis* will com-

prehend the intermittent and hectic fevers, in which the spasm disappears altogether for some time, and then returns after a longer or shorter interval. They may be further subdivided into species, by the relative amount of determination or congestion found in each. These species may be indicated by the terms, acute, subacute, and chronic. By acute *kyârtis*, we shall mean those cases which have more determination than congestion, as the synocha of Dr. Cullen; by subacute, such fevers as have determination and congestion in even proportions, as synochus; and lastly, by chronic, such as consist more of congestion than determination, as typhus. All these cases may either be simple or productive, that is, pure or complicated, with products.

*Classification of Kyârtis.*

Genera.	Species.	Species.	Species.
Current ..	1st determination in excess, or acute	2nd determination even, or subacute	Congestion, excessive or chronic
	Synocha { productive or simple	Synochus { productive or simple	Typhus { productive or simple
Concurrent	Confluent eruptive fevers { productive —	Mild eruptive fever { productive or simple	Malignant eruptive fever { productive or simple
	Inflammatory remittent { productive or simple	Mild remittent { productive or simple	Malignant remittent { productive or simple
Recurrent	Inflammatory intermittent fever { productive or simple	Mild intermittent fever { productive or simple	Malignant intermittent fever { productive or simple
			Cholera, Hectic fever

## CHAPTER XVIII.

## DEFINITION OF DISEASES.

THE object of a definition is to convey in a few words the greatest number of known facts concerning any one subject ; every definition should, therefore, combine simplicity and conciseness of expression with all admissible or possible comprehensiveness and precision of the ideas it contains. It ought to embrace the whole disease, if possible ; at least represent its most essential particulars. At present all that authors care to do for this purpose is to string together some of the prominent symptoms of a disease. For instance, inflammation is defined to be a combination of heat, swelling, redness and pain, and fever, that of languor and lassitude, feeling of debility, loss of appetite, great acceleration of the pulse, increased temperature of the surface, and defective secretions. All these, however, are symptoms, and, as such, mere expressions of the disease, and not the disease itself. Languor and weakness denote some derangement of the ganglionic function, and so lassitude and debility manifest perverted spinal action ; they are indications of a disease, but a disease is one thing, and the indications of it are another. To define a disease by its symptoms is like describing the soldier by his accoutrements, or the deeds of his prowess in the field by a record of his dress. Contrast the definition we have given of inflammation with that of other writers, *i.e.*, *productive determination* or *congestion*. Our definition not only names the disease, but at once explains its essential characters, viz., dilatation of vessels with more or less freedom of the motion of blood in them, with products or a strong tendency to production. By the present method of defining, which only comprises the symptoms, we leave the whole disease to be inferred by the student, who, after a



hopeless rush or two at some spectre of the real malady he is searching for, resolves himself at the eleventh hour to subscribe to or invent some convenient theory as a cloak to his ignorance. But, on the other hand, the plan we advocate, if followed, would enable the student to at once grasp the disease by the hand, and he may contemplate it and its symptoms at the same time. We shall not define every disease that has been described; in fact, our method is so simple that we can safely leave the greater number of them to be put into proper formulæ by the student himself. Thus, neuralgia may be defined as a perverted, excessive, sentient concordance, which may be either cerebral, as in tic doloieux, intolerance of light or sound, &c., or spinal, as angina pectoris, sciatica, irritable mammae, irritable testicles, &c., or again ganglionic, as pleurodynia, gastric and intestinal pains and irritations, &c. In the same manner defective sentient cerebral concordance will do for all nervous paralysis connected with the brain, as nervous blindness and deafness, and loss of the power of smell and taste.

*Definition of Muscular Diseases.*

*Hydrophobia* = general existent (convulsions) and partial co-existent (lockjaw) and concordant spasm (tonic spasm) of voluntary muscles + excessive spinal motor accordance + perverted mental accordance (fear of water) + canine poisoning.

*Tetanus*, = general existent, and partial co-existent (opisthotonus, &c.) and concordant spasm + excessive spinal motor accordance - perverted mental accordance (fear of water, &c.).

*General convulsions* = general excessive existent and accordant spasm + excessive spinal motor accordance.

*Chorea* = general existent and accordant spasm + perverted excessive spinal motor accordance.

*Hysteria* = general existent and accordant spasm + excessive spinal motor accordance + perverted mental accordance (crying, laughing, &c.).

*Epilepsy* = general existent and accordant spasm + excessive spinal motor accordance + defective mental accordance (loss of consciousness).

*Delirium tremens* = general perverted and accordant spasm of voluntary muscles + perverted spinal motor accordance + perverted mental accordance (delirium).

*Catalepsy* = general complete coexistent and concordant spasm + cerebral and spinal motor concordance.

*Paraplegia* = defective motor accordance of one *half* of the spinal marrow.

*Hemiplegia* = defective motor accordance of one *side* of the spinal marrow.

#### *Diseases of Determination and Congestion.*

*Simple local determination* = some cause of obstruction in the minute capillaries (generally spasm) + dilatation of vessels around the seat of obstruction (defective ganglionic motor accordance, + more blood in the vessels dilated, with free motion of that blood + increased *vis-a-tergo* + exalted sentient ganglionic accordance.

*Simple local congestion* = idem\* — increased *vis-a-tergo*.

*Productive local determination* = idem + production (product, if lymph or liquor sanguinis, *inflammation*).

Idem (product, if serum, *dropsy*).

Idem (product, if effusion of blood, *hæmorrhage*).

*Productive local congestion* will admit of the same definition according to the nature of the product, *i.e.*, whether liquor sanguinis, serum or blood; the result being respectively *chronic inflammation*, *chronic dropsy*, and *chronic hæmorrhage*.

*Intermittent kyâtis* = general determination (especially of the skin) + congestion (especially of the internal organs) + defective and perverted sentient spino-ganglionic accordance (langour and lassitude, weakness and debility) + recurrent spasm + or — production.

*Remittent kyâtis* = idem — recurrent spasm + concurrent spasm.

\* Idem means the same as last, or that immediately preceding.

*Synocha* or *common continued kyâitis* = idem — concurrent spasm + current spasm.

*Synochus* = idem + additional general determination.

*Typhus* = idem + more general congestion than determination.

*Small-pox* = general determination and congestion + defective and perverted sentient spino-ganglionic accordance + products + current spasm + infection.

*Hepatitis* = productive determination or congestion in the liver + or — general determination or congestion (*kyâitis*).

*Carditis* = idem in the heart.

*Boil* = idem in the cellular tissues, skin, &c.

### *Spiritual or Mental Diseases.*

*Mania* = excessive, defective, or perverted, *intellectual, reflective, rational, or moral sensations, or accordances and concordances*, severally, or two or more conjointly, constituting the numerous forms of the disease, which we leave to the student to analyse and define at leisure in a lunatic asylum.

We have nothing to say with regard to diagnosis of disease. The key here supplied by the definitions will enable any student to diagnosticate or distinguish any malady.

## CHAPTER XIX.

## A FEW WORDS ON THE CLASSIFICATION OF DISEASES.

THE utility of a systematic arrangement of disease has been admitted in all ages, and various methods have been adopted to divide this motley enemy into natural families and orders. We can recognise only six great classes of disease. The first class will comprise those in which the nerves are most concerned, as headache, earache, tic doloieux, angina, sciatica, paralysis of sensation, blindness, deafness, &c.

The second is that in which the muscles are chiefly affected, as hydrophobia, tetanus, chorea, epilepsy, &c. The third comprehends the diseases of determination and congestion. The fourth will embrace the affections of the mind, as the different forms of mania. The fifth will involve those of nutrition, as tumours and other growths; and, lastly, the sixth will include the diseases of the epithelial tissues, as the scaly diseases of the skin. These classes may respectively be called nervous, muscular, vascular, mental, nutritional, and epithelial disorders.

Some of these will admit of a further subdivision into orders and genera. Thus the nervous affections, some from loss and others from exaggeration of the nervous sense; the former include paraplegia, hemiplegia, dysphagia, &c., and the latter, angina, burning of the body, cephalagia, &c. The muscular disorders may be subdivided into those of *existent*, *partially co-existent*, and *completely co-existent spasms*. The vascular diseases have been already analysed (*vide* inflammation and fever). The mental diseases may be grouped under the several heads, according as the *intelligence*, *reflection*, *reason*, or *moral sense* suffer, separately or in various states of combination. The fifth class, which refers to morbid

nutrition, may be divided into three varieties of disease, viz., those of *excessive*, *defective*, and *perverted nutrition*. The last class, epithelial diseases, would in like manner admit of a number of groups, according to the mode of morbid growth, transformation, and sealing off of the extra vascular cells, which take place in many of the diseases of this extra-vaseular tissue.



## CHAPTER XX.

A FEW OBSERVATIONS ON THE GENERAL  
PROGNOSIS OF DISEASE.

THE prognostication or foretelling of the probable consequences of a disease is a subject to which, above all others, the attention of the student should be early and particularly directed, not only to enable us to satisfy the troublesome queries of the patient and his relatives, whose anxieties, fears, and hopes are often balanced by the least breath or gesture of the physician, but more especially to provide ourselves with a sort of premonition, in order that we may always be on our guard and prepared for any emergency. It is, however, the adept and the most experienced physician, ready in understanding, steady in reflection, acute in reasoning, and conspicuous in generalization, that can dare to correctly count the subtle oscillations of disease between life and death. All our first attempts at such exact and concrete divination must necessarily fail. We must have patience, and at the same time use our opportunities with diligence and in a manner befitting our profession and our great responsibility.

As a general rule it may be laid down that the diseases purely nervous, spiritual, and muscular are less fatal than those of congestion and determination; they have a more or less protracted course, as mania, epilepsy, chorea, hysteria, angina, &c., and when they end in death it is by the super-addition of congestion and determination.

Hydrophobia and tetanus prove rapidly fatal partly by the extreme exhaustion of the nervous sense, and partly by their interference with the vital functions. All these diseases have a remarkable periodicity which is faintly observed in maladies in which the dilatation of vessels forms a part of their phenomena.

The greater part of our mortality, however, is occasioned by determination and congestion. Too excessive determination or congestion with inordinate products and continued excessive or defective discordance, hence morbid concordance, is surer to be more on the side of death than life, especially if the determination or congestion be extensive and general, as in kyâitis, small-pox, &c., or seated in an organ which is intimately connected with alimentation, realimentation, or super-realimentation, as for example, kyâitis, gastritis, enteritis, pneumonia, carditis, phrenitis, &c. These conditions being reversed we can safely predict a favourable crisis.

So long as the *vis-a-tergo* is not impaired, and acts on the determination and congestion, we are yet on the secure side, but when the power of the heart flags and it becomes irregular and of uncertain rhythm and force, we might be justified in pronouncing that the ship is anywhere but in its right port. Besides the instruction we receive from the present condition of the sick in forming a prognosis, we usually derive much assistance from a consideration of the former bodily and collateral circumstances, such as the sex, age, previous health, peculiarity of constitution, atmospheric influences, the character of the epidemic, poverty or richness of the individual, his prejudices and habits, his likelihood or otherwise of obtaining proper medical aid, the remote cause of the disease, &c. For information in these important matters the student must consult other works.

## PART II.

ESPECIAL RECOGNIZANT DISEASES OR GENERAL  
CONCRETE STATES OF THE SICK.

WE were hitherto employed in tracing the elements, primary and proximate, of the *cognizant* or ordinary pathology; but we shall now point out the *recognizant* diseases composed of the ordinary affections and their elements; in other words, the *real whole states of the sick*. We can admit of only four *recognizant* diseases or general states of the sick, viz., *Inanition*, *Adulteration*, *Emaciation*, and *Enervation*.

By *inanition* we comprehend that simple lowness or depression of the system, that gradual or sudden failure of the vital powers, which is induced by simple insufficiency of food, or deficiency or loss of blood (*pabulum*). *Adulteration* will represent the state of the body arising from the presence of poisons or other foreign matters in the blood. *Emaciation*, on the other hand, is the gradual wasting of the body, not only from deficiency but perversion of blood; and lastly, *enervation* is a slow or rapid diminution or destruction of the nervous sense.

## CHAPTER I.

## INANITION.

INANITION may be of two kinds, viz., that from direct loss of blood, and that from want or privation of food or proper nourishment.

Inanition from direct loss of blood may be produced suddenly or gradually, according to the quantity of blood lost. When suddenly, induced by too large an abstraction, as in the rupture of the heart, wounds of large arteries, and veins, &c., it terminates in rapid fainting, and usually death by syncope.

The symptoms of this acute hæmorrhagic inanition are a feeling of sinking in the pit of the stomach, lightness of the body, giddiness, noises in the ears, irregular indistinct vision, swinging of the head, hurried breathing, sinking imperceptible pulse, sudden paleness and ghastliness of the features, cold extremities, with clammy perspiration, followed by collapse.

In the ordinary cases where the hæmorrhage is idiopathic and gradual, the body is slowly robbed of its proper quantity of blood, and it not unfrequently happens that one fit of syncope succeeds another, till the drain is so complete that life emits no more sparks to light up a further reaction.

They are characterised by paleness and lividity of the skin, coldness of the extremities, which are also shrunk and perhaps œdematous, bloodlessness of the eyes, lips, and face, sunken, hollow countenance, dizziness, giddiness, noises in the ears, fainting or proneness to it, hurried breathing, weak pulse, being excitable by the least exertion ; there is also great weakness and debility, &c.

The treatment in the accidental cases, where it admits of any, would consist of transfusion, perfect rest, compression, or tying of the arteries, sedatives, nourishing diet, cold, &c. In the idiopathic variety, however, the addition of bleeding, purga-

tives, astringents, and tonics is frequently had recourse to with advantage, according to the nature of the case, whether sthenic or asthenic.

*Inanition from Deficiency of Food or Nourishment.*

This variety of inanition may be considered under two heads, viz., insidious and obvious, the former as in poverty, and the latter as in famine.

1st. *Insidious Inanition.*—To be able fully to comprehend the extent and nature of this inanition and its influence on the social, intellectual, and moral relations of mankind, it is necessary that we should here take a general view of the human race as respects its physical organization on the basis of property or worldly effects.

In every country and under every form of government the population is divided into two principal divisions, viz., the rich and poor. The rich are better fed, or, perhaps, overfed: they are better clothed, and surrounded with every extravagance and excess in fashion, luxury, and taste. They live upon the fat of the land, and are truly the living monstrosities of nations. Their beauty, their development are, so to speak, somewhat over apace or above par, and certainly by no means of the natural standard. They are either too much blanched or too much flushed, too excessively grown in some parts, and defectively in others, and their life is ever bordering on disease; they wear rather a showy than a substantial robe of humanity. Their movements are sluggish; they must be carried on some vehicle from place to place; things must be handed to them to fulfil their various bodily and sensual wants. They are hollow embodiments of what they profess to be, with no force, no power, and almost without a will of their own, unless in the restlessness of their voluptuous desires and passions, and the insatiable greed with which they seem to seek these animal pleasures. Without the manly energy of their own, they must be fortified with the strength of parasites who have to coax them, take the lead-



ing-strings and guide them, wheedle them, and lead them by the nose at their sweet leisure. Being virtually helpless dependents on others, their idea of greatness must, in a great measure, consist in an exaggerated conception or sense of their own personal state, one of resigned sovereignty, in other words, the sovereignty of human independence and liberty. The choice is not theirs; the will partakes of the lower rather than the higher man, and it commands to be commanded. The deluded man imagines that to live to enjoy is absolutely to submit, and all must submit to him, too, who wish to enjoy most of the blessings of this earth; to him a blind servile dependence on others is the true measure of happiness.

With an unlimited accumulation of the savings of labour at his command, the rich man can well afford to buy off the liberty of those round him, and soon surrounds himself with an array of slaves and sycophants. But this is not all. The hoard on which the whole of this state depends, and which had no doubt once been made with much earnest industry and forethought, begins before long to thaw and gradually melts away, and the anxious possessor must replenish his exhausted treasure in some way to keep up his luxurious ease and indolence. The facile army of idlers who live upon the bounty of the rich are just the instruments and the most handy servitors to effect his object, and straightway they are let loose in manifold ways to suck in and feed upon the vitals of the unwary poor. The exquisite tact and skill displayed in a most elaborate, unholy organization—the so-called *political institutions or governments as a rule*, to oppress, the defenceless masses—it is for political economists to unfold. Our object is here to simply point out the one-sidedness and unfairness of an arrangement by which one class of people abuse unconsciously, it may be, their opportunities and power to appropriate any thing rightly not their own, to their own advantage, and enslave the other, the majority of our race—the wretched dumb poor—who, left to subsist on what coarse and scanty fare they can get, have for ages past been insensibly

undergoing a sort of slow, almost imperceptible, but sure starvation, to which their manifest degradation in later days is in a great measure to be attributed. I do not mean that all this was premeditated and done intentionally, but owing to imperfections in the first social organization, combined with the innate selfishness of human nature, abuses such as I have mentioned gradually erept in, while there were no incentives from its good side to afterwards check and mend them. Nor do I mean that all rich are alike; there are noble exceptions. In short, the nobility of human nature, must often, by its native impulse, here and there spontaneously, force itself to full recognition; and we have indeed many bright examples of good and true men, especially among peoples of modern civilization; but these can be looked upon only as exceptions, and I still maintain that the well-to-do, the prosperous, the man rolling in wealth, does not know, nor does he acknowledge the duties his prosperity entails on him, and the true uses of property. The ancient Arians, who, for the first time, perceiving the elements of human greatness in the accumulation of knowledge, for which man was eminently fitted, and who accordingly began to write and note down everything they saw, felt, and perceived for this purpose, omitted one most important matter in the construction of the social political government of which they were, no doubt, the first originators, while all other tribes were still nomadic, viz., to enquire into and settle once for all to what use the superfluous resources or fruits of industry of individuals was to be put in the general economy of the community. Had this been done at the first starting, we could never have had to regret the spectacle of one man dying of hunger and want, while another, his perhaps immediate neighbour, with every abundance at his disposal, gorged himself to excess, generally to his ultimate detriment. Instead of this, the Arian progenitor of human society and human *so-called civilization* busied himself in impressing on his brethren his own importance and greatness in the commonwealth. He taught what the Brahmin was, and he made a Brahmin of every rich influ-

ential and intellectual fellow-citizen; forsooth, because his new creatures knew somewhat what was what, and they could lisp faintly, as being more intellectual than the commoner, the idea within himself of the knowledge of God, which he called Brahma, and whose attributes he afterwards extended all to himself.

Brahminism, thus first started, grew with a mighty force, as was to be expected, and soon overspread the land of Ind, until every man without its majestic and sublime pale quailed before its awe-inspiring presence, and he was helpless, left no option, and could do nought else; but all his life he must only study the self-constituted *Demi*, or *Man God*, the *Brahmin*; he must study and learn the *Brahmin* well; he must feel most thoroughly and intensely the *Brahmin*; he must live in the *man Divine*, and he must die in his faith. This is certainly a nice way of dying, to live no more. But the Brahminism of India in conjunction with Arian civilization has extended over the whole world, and compared to the world's Brahminism, it is hardly a drop in the ocean.

The poor are unquestionably insufficiently and irregularly fed; they have a tax to pay on land, and for every thing they buy to the rich, for which they seldom get any sufficient return. They cannot provide themselves with comfortable habitations, and their clothing is defective for want of means. They have perhaps as many to support as the rich, yet their scanty wages, or the produce of their fields, is far from being adequate to their incessant wants. They are, unlike the rich, as economical as possible; but, unfortunately, their economy does not save; there is something still always wanting. In fine, they are in a perpetual turmoil of difficulties. Being as a matter of course irregularly nourished—perhaps a stage below that of nature, and poorly clad and dirty—they are continually exposed to the mercy of all the elements, now shivering and trembling with cold, now being roasted under the burning sun, and now choked and suffocated in some stinking, ill-ventilated hovel.

Again, their incessant bodily wants render them naturally

forgetful of or callous to their intellectual and moral advancement; therefore, they are solely occupied with their corporeal sensations. Their mind grows into an immense wilderness, or a desert of, as it were, mirages and spectres; their body likewise has perhaps lost its natural contour, and has sunk, it may be, within the standard mould, it is ill-prepared to resist disease to which it is ever obnoxious. Their growth must be interfered with; and either, it may be, they are ricketty and scrofulous, or bed-ridden with some incurable malady. Old age comes prematurely on them, and their death bed is not far distant. They are, indeed, the most miserable, the most wretched, and most malformed of our race.

Both the rich and the poor have deviated many degrees from the normal structure and function of the real man; they are the two extremes and disfigurements of true humanity. For the original man we must perhaps go to the middle class, including the present nobility of Europe, which, as the representative of the pure Adamic type, has held its distinguished place in all ages and countries. It is, as it were, the manufactory of all arts and sciences, and the warehouse of all trades, peace, enterprise, and heroism. Its renown, unlike that of the kings and warriors, never dies; its religion does not corrupt, nor does its solemnity ever perish. It is a field of research, discovery, knowledge, peace, and advancement. In it the mind is acting unshackled, with the improved force and energy of its original purity. And it is this class that we should look to for the means of ultimate regeneration of the rich and poor; for the repression of the unbounded extravagance and vanity of the one, and for the raising and supporting of the now tottering humanity of the other, both at present tending to the ruin of our lofty creation; for in both there is an inanition. In the rich it is with respect more especially to the nobleness of the human mind, and in the poor with regard to the nobleness of the human body. Let the middle classes then exert themselves and do their duty as becomes their station and mission in society. Let them collect together the stragglers and trespassers, and the waylaid and

oppressed of our race in the sheepfold of sense, propriety, peace, and piety. Let us not fear the sharp horns of the Brahmini bulls; reason will ultimately conquer selfish instinct. Every man agrees with another man in the fundamental aims of our worldly life. We are all desirous to be happy, wise, peaceable, honest, religious, &c.; and we all know that, as regards the essence of these conditions when attained, one individual cannot enjoy any one of these states more than another. For instance, one cannot be truly happier than another. This assent of mankind as to the true objects of our temporal existence is one which is universal and innate, and not the result of theory or calculation. If all our objects then be equal and common, why should we be different in other respects, in the mode of attainment of these objects? Is the division of society into rich and poor, in other words, as at present into luxury, indolence, and haughtiness on the one hand, and distress, slavery, and lowness on the other, the only ascending ladder to our coveted destiny? Are we not like the barbarians, doing everything rather to oppose than foster the independence, the happiness, and all that is truly great and good for man? Every step from richness to poverty, without the necessary knowledge of the uses of wealth, and the obligation it imposes, is a precipice from which one must fall into unholiness and crime. The surplus fruits of industry should go to feed and support the lame, the halt, the sick, the deaf and dumb, &c., and when these have been attended to, to some common good of the whole community. Riches engender covetousness and jealousy in those who do not command them; covetousness and its intrigues tend to crime; crime begets ungodliness, and ungodliness destines its victims, need we say where.

*Why should we not be equals in at least our most essential worldly possessions, not according to the French equality, but the equality of human necessity? Can we not work for the community alone, and enjoy our share of our labour by an equal division of the common stock, measured by what is absolutely necessary to human existence, and our purity and*



rational pleasure. What we here mean is, that *our absolute wants, such as good and wholesome food ; pure air and water ; decent, comfortable raiment ; pretty, well built dwellings ; and a solid, useful education, physical, intellectual, and moral*, should by some means or organization be first supplied ; if for this a heavy general contribution or income-tax on the surplus incomes be required, let it be so, and if after this legitimate use of property there is more left, let the possessor then have as much personal state or luxury with it as he likes. Let there be but one word, one principle of action—the good of mankind ; and let our emulation and motto be : the greater good we do to our fellow-brethren, the greater the man. We should constitute lords and nobles, but the lords and nobles of the quantity of good they have done to the nation or community. Our magistrates and collectors would so manage the collection and distribution of the national supplies, that not only each individual member would get in full, if possible, what he may be *in immediate need* of, but would at the same time see that every soul in the brother or sisterhood did the duty appointed to him or her. We should have public institutions for the instruction of the community, national baths, gardens, &c., for public recreation and service, hospitals for the sick, asylums for the blind and decrepit, &c., houses should be built according to some plan or plans to be determined upon, and their sanitation looked into by deputies and sub-deputies. There should be no difference of rank as regards the professions, which should be allotted to each individual by committees of masters or elders according to the fitness of the person, or the necessities of the public. There would be no occasion for begging and thieving in a community in which every man is adequately fed and clothed, enjoyed the same rights, and possessed the same opportunities. Idlers would be either punished or put in prison, and worked like ordinary prisoners, or driven out of the nation if irreclaimable to its interests. The greatest crime and disgrace is shirking duty, and the noblest act is the greatest quantity of good done to the nation. The greatest men in the common-

wealth would be nominated to the highest and most responsible offices, with this necessary provision, that they should hold subordinate situations, other men having become more distinguished after them. The highest in the land would not get a better ration as regards the *essential wants of health* than the poorest subjects, although the latter would be bound to render full allegiance to the truly illustrious beings who have risen to the important offices of state, and the sovereign benefactors of the Republic or Kingdom.

*Obvious Inanition or Starvation.*

Cases of starvation are of frequent occurrence, and if succour, where it is possible, be not at hand in time, terminate in death in a few days. It may be brought on by permanent stricture of the œsophagus, or of the intestines, want of food, as in famines, refusal to take food, as in some lunatics, &c. The symptoms are at first excessive hunger and thirst, accompanied by burning pain in the stomach, which is relieved by pressure and weight. The mouth, lips, and throat become parched and dry, the eyes look glistening and sometimes congested, with ulceration of the cornea; there is great weakness and debility, and languor and lassitude; the body is gradually attenuated, with perverted secretions and excretions; the skin and lungs exhale a fœtid odour; the pulse gets lower every day, and sometimes the appetite is completely lost in the course of the disease. The discordance, accordance, and concordance of the nervous system become so wild and agonizing towards the close of life, that death is not unfrequently occasioned in a fit of maniacal delirium and convulsions. Adults will bear starvation longer than infants, and some people by habit may be able to resist it for many days, provided they remain perfectly quiet. The simple ingestion of water seems to have prolonged life for a few days. The average time of death in ordinary cases, however, is about the seventh day.

The remedies for this form of inanition are obvious and require no special comment.

## CHAPTER II.

## ADULTERATION.

By adulteration we comprehend all those general states of the sick which arise from the introduction or retention of some poison in the system. It is the most fatal disease with which we are acquainted, and its consideration therefore is of the utmost importance to the young physician. Nearly three-fourths of the maladies to which we are subject may be traced to adulteration of the body with some poison; thus *kyâitis* is caused either by malaria or some infectious germ, as the exanthematous poison of small-pox and the infection of typhus, syphilis by the venereal virus, gout by lithic acid, &c.

We shall recognise the following as the principal forms of adulteration, viz., the malarial and the ordinary infections, the exanthematous, the venereal, the gouty and rheumatic, the toxicological, the animal, and the accidental.

*Malarial and the ordinary Infectious Adulteration.*—Under this head we shall arrange all the varieties of the so-called idiopathic fevers and cholera. We have no doubt that these affections owe their origin to some poison in the air (it may be in the water or food also), as malaria or some infectious agency which, being imbibed by the lungs or through other medium, mixes with the blood to produce the various trains of phenomena characteristic of those diseases. What is the nature of this infection? What is malaria? Whether it is the same poison in every case, varying in intensity, or whether there are different poisons, some being animal and others vegetable, are points which require further investigation. Nevertheless, from the history of the different species of *kyâitis* we have reason to infer that the poison which

causes typhus does not generate an ague; the former appearing invariably to be of animal and the latter of vegetable origin. Again, malaria does not seem to propagate itself by multiplication, at least in the same way, in the animal body, that is, indefinite increase by progeny, as in infection. It would appear on the other hand to gain in force by concentration or constant addition of more and more marsh-poison from without. Hence, perhaps, malarial diseases which depend on the exhalations of the ground alone, are generally endemic or limited to the boundary of their peculiar effluvium; while those that are infectious, being of an animal origin, and their poison being formed both within and without the animal from decomposition or some perversion of animal matter, spread from individual to individual without any limit, where favourable circumstances prevail, causing an epidemic. Further, malaria or marsh miasm appears to be heavier than air and to be attracted by green vegetation (this might be from the viscid nature of the poison, which consequently sticks to leaves), and the *kyâitis* it produces is more or less of the intermittent type, as if vegetable growth were limited, and not very favourable in the bodies of animals. These characteristics are not observable with infection, which generally excites continued *kyâitis*. They both cause their discordant impressions on the spino-ganglionie nerves, hence follow languor and lassitude and the feelings of weakness and debility. They are likewise the chief agents in giving rise to capillary spasm, which is essential to the formation and maintenance of *kyâitis*, and lastly, they are the ultimate cause of the diminution and perversion of the secretions and excretions, and also all the secondary discordance, accordanee, and concordance met with in the course of that disease.

*Eranthematous Adulteration.*—The general characteristics of this adulteration do not present many points of difference from those of the preceding variety. It may be distinguished, however, by the following particulars:—

First, that it may be produced by direct contact of the poison with the skin, as by inoculation; secondly, by the

greater intensity of its determination to the skin; thirdly, by the termination of the cutaneous determination by an efflorescence; fourthly, by its greater tendency to multiplication by propagation, so that the minutest quantity of the poison is sufficient to rapidly leaven the whole blood, and a single solitary case may be the occasion of an epidemic visitation; fifthly, that it seldom occurs more than once during a lifetime; sixthly, that it exempts no individual; seventhly, that it destroys life, mostly by productive determination and congestion and the consequent enervation. Between the poison of exanthemata and that of an ordinary infectious disease, such as typhus, there seems to be this difference, that in the latter the source of infection is in all probability a perfectly dead and perverted particle of animal matter incapable of communicating vital property to other suitable matter, although able to cause mischief by its presence otherwise, such as through chemical action; whereas in the former, viz., the exanthemata and similar diseases, the poison appears to be, somehow, an altered or diseased particle of vital matter itself, or matter still living and capable of morbid growth and propagation of its kind, as with ordinary primordial living matter.

Hence this class of diseases may be said to live as other organized beings, with this difference, that as they are incompatible with human life, and must live as parasites, as it were, they must perforce live at the expense of those upon whom they might, for the time being, be conveniently billeting themselves. All organic poisons capable of growing and reproducing themselves, such as the syphilitic, the cancerous, the virus of plague, must belong to the same family and their diseases must also be more or less alike; that is, although they are *altered living matter*, and do, as such, live in one sense, they are essentially different from *healthy vital germinal matter*, and must ere long destroy life, unless there is yet sufficient natural resistance to at once repel them, or the remaining unaffected living matter can still safely carry on life until the deleterious germs shall have either exhausted themselves or been robbed of their power of mischief, or



neutralized or disposed of in some way. It must be always borne in mind that so long as a person lives under infection, no matter of what kind, whether from plague, small-pox, typhus, &c., so long the healthy living matter in the system must predominate over the diseased for the time being, otherwise life in fact could not go on; but as soon as the diseased living matter gets the ascendancy in this respect, that is, in respect to incompatible quantity, the patient must die. There is therefore still, always hope, however faint, so long as one lives, howsoever feebly.

*Veneral Adulteration.*—It is produced generally by direct contact with the diseased surfaces of coition, exciting productive determination of those surfaces previously in a healthy state. The poison of syphilis propagates slowly, and affects secondarily the skin, the joints, the throat, the nose, &c., and even tertiarily still deeper and more remote structures. It, however, easily, as a rule, submits to elimination, and seldom causes death. The trains of phenomena arising from this adulteration are too well known to the student to require further examination.

Syphilis is a parasite\* which assumes the most diverse forms in the system, according to the extent and duration of the disease, and the age, constitution, and other circumstances connected with the victim.

*Rheumatic and Gouty Adulteration.*—We have no doubt that in rheumatism and gout the blood is surcharged with some poisonous materials formed in the body, which being injurious to its well being occasion the well-known symptoms of those two affections. Lithic acid has been proved to be abundantly formed in gout, and the perspiration of the rheumatic patient is known to be remarkably acidulous, owing to the excess of acetic or lactic acid it contains. Both these diseases are prone to seize joints, and kill, if suddenly, by complication, as pericarditis in rheumatism, or spasm of the stomach in gout, and, if slowly, by inducing emaciation.

\* The word is used here in the sense that the poison of syphilis lives on, or at the expense of healthy animal pabulum.

They are not infectious, but hereditary, and prevail more frequently in cold and moist climates.

They are pre-eminently the offspring of a peculiar diathesis, inherited or acquired, it may be, which may be supposed to be due to some slight change in the living primordial matter of the frame on which the every day affairs of life mainly depend, and which change perhaps unavoidably gives rise to an undue production of the acids that seem to underlie these two disorders.

*Toxicological Adulteration.*—It is exemplified in narcotism, purgation, prostration from the use of tartar emetic, tobacco, and digitalis, salivation, alcoholic intoxication, ergotism, and poisoning in general. For information on these several subjects the reader should consult works on toxicology and materia medica. All these poisons are generally introduced into the body by the surface of the alimentary canal, and prove mortal by giving rise to either inanition, emaciation, or enervation. These poisons, from the very nature of things, are incapable of growth, and of vital multiplication.

*Animal Adulteration.*—Is seen in the bites of poisonous snakes and hydrophobia. It commences from any part of the body, often very deep in the muscles and cellular tissue, and progresses rapidly or slowly, as the case may be, to terminate in death. The snake poison does not multiply, but proves fatal by giving rise to perhaps very rapid retrograde changes in the minute living parts of the body, such as the corpuscles and germinal matter itself, and consequently giving rise to extreme depression of the nervous system, that is, by a defective general sentient accordance. The canine adulteration, however, acts in quite a contrary manner; it propagates in the system by forming perhaps new virus, but evidently without much retrogression of vital structure, and determines its fatal issue by excessive general motor accordance, causing spasms and convulsions.

*Accidental Adulteration.*—It may take place from two sources, internal and external, the former as retained secretions or abnormal productions, as in suppression of urine, dif-

fusion of pus through the circulation, cancer, &c., and the latter as in exposure to earbonic acid, sulphuretted hydrogen, &c.

They all produce a state of general congestion of the body, or asphyxia and coma; hence they are invariably characterised by defective general discordance, accordance, and concordance, as evidenced in the defective and perverted secretions and excretions, and nutrition, langour and lassitude, prostration of tone and strength, vertigo, giddiness, dissonant noises in the ears, delirium, coma, &c. Our prognosis in these cases is always unfavourable, and certain death may generally be looked forward to. Cancer is the longest to prove fatal, and gives rise to considerable emaciation, unlike asphyxia, which destroys by rapid inanition.

Suppression of urine and bile have a medium course and termination in this respect.

The different forms of embolism will also naturally range under this variety of adulteration. The embolism of the heart will produce instantaneous death.

*Adulteration by Abnormal or Excess of Normal Structure, or of certain Nutritive Materials.\**—Under this head we might include all the ordinary tumours and other abnormal growths, corpulency, &c. The cancerous adulteration is no doubt due to diseased nutrition; and its source is within the animal, although it may be transmitted to progeny. The ordinary

\* Properly speaking, in the growth of tumours it is the excess of certain materials in the blood (adulteration) which leads to their formation, inasmuch as a normal structure once constructed is a fixed one, and can never be reproduced over and over again. For instance, in the case of an abnormal bony growth it is not the entire bone which grows, or another bone like it is formed to give bulk to the diseased bone, but simply more bony matter, which may be in excess in the blood, is added to the original bone. The same holds good with other unnatural enlargements. In corpulency it is not the fatty structure which increases, but if there be excess of fatty matter in the blood, such matter is simply deposited in the original adipose structure. In fatty tumours the original cellular tissue might appear to be extended, but it is really not so. These are new secondary false bands, formed as the tumour grows, to support and enclose the increasing deposition of fat. In all other hypertrophies it is the same: it is the addition to the original structure, and not extension or reproduction of original structure that really constitutes the unnatural growths, and the matter added is always an adulteration, either in excess or perversion.

living matter undergoes some change incompatible with life. It is a retrograde change, and perhaps the living matter thus affected is contracted or endogenous in its growth, that is, it grows inwardly by division of its centre or nucleus, and the nuclei into nucleoli, and so on, until the affected portion of the matter is all used up (or it may be that after an attempt at endogenous growth it simply breaks up into diseased molecules, in other words, undergoes complete disintegration), unlike the living matter that produces innocent growths and tumours, in which the growth is, on the other hand, enlarged, or exogenous as it were, and takes place outwardly by constant addition from outside. Hence it may be why we find the cancerous growth so remarkably quiescent and slow at first, until in time the other parts of the system are similarly affected, and hence also why the growth of the other abnormal developments, the innocent tumours, is proportionally so rapid and tumultuous, so to speak, from the first. The hardness of the schirrhus is owing to the protective formation variously or irregularly investing it when nature is still strong, and not much overpowered by the fell growth. In course of time she is undermined by further ill-nutrition and she has no longer the power nor the proper material wherewith to throw this dense wall round the disease. Hence in the later stages, the cancer is always either an exposed or very loosely invested structure.

*Causes and Prognosis of Adulteration generally.*—The causes are either internal or external—*internal*, such as pus in phlebitis, carbonic acid in asphyxia from disease of the lungs and heart, interfering with the due discharge of that gas; suppressed urine, bile, &c.; and *external*, as malaria, poison of small-pox, plague, syphilitic and gonorrhœal virus, an over dose of medicine, exposure to noxious gases, or any dead or diseased animal matter introduced from without.

In inanition the nutrition is simply defective, but in adulteration it is poisoned, so that the blood, the pabulum of the animal support, is no longer fit to supply those conditions to the constituent tissues and organs, which are essen-

tial to the preservation of health. It is more or less degraded, musty, and disorganised, according to the nature, seat, and intensity of the virus, and the predispositions and circumstances of the sick. When the deleterious agent is mild and slight, if not removed or destroyed rapidly, it generally determines to death by emaciation, as in intermittent *kyâitis*, synochus, syphilis, gonorrhœa, slow asphyxia from slight but protracted exposure of the lungs to poisonous exhalations, cancers, &c. Where, however, the cause is sudden and intense, and excessive in quantity, death is generally direct and instantaneous, as in the Bombay fever, cholera, some cases of plague, asphyxia from sudden stoppage of respiration or exposure of the lungs to carbonic acid, chlorine, nitrogen, oxygen, &c. In the same way poisons of intermediate force and malignancy cause death neither too slowly nor too quickly, as death from suppression of urine and bile. Some of these poisons may be said to act more on particular surfaces in preference to others. Thus some determine to the skin, as in *kyâitis*, exanthemata, syphilis, &c., some to the mucous membranes, as in cholera and gonorrhœa; some to glands, as in plague; some to the joints, as in gout and rheumatism, and some especially to the nervous system, as in narcotism. The ratio of mortality among the diseases of adulteration among mankind is according to the following order: *kyâitis*, exanthemata, rheumatism, gout, plague, poisoning, asphyxia, syphilis, gonorrhœa. It is the greatest in *kyâitis* and least in gonorrhœa.

*Treatment of Adulteration.*—The class of medicines known as the specifics, are herein called for. The term antidote is more expressive, and we shall, therefore, adopt it in preference to specifics. Antidotes act in such a manner as not only to directly destroy, neutralize, or dissolve the poison, but by their presence in the body they may be supposed to check or prevent its further formation. In other words, they appear to act both as antidotes and prophylactics. The nature of their action seems to be more of a chemical than of a physiological character. We must here premise that of the numerous diseases which naturally come under the head of



adulteration, there are only a few whose specifics have been discovered; probably every one of them has its peculiar antidote, at present shrouded in our ignorance of chemistry and pathology, and a day may yet dawn when we shall be able to apply our curative means to the suppression of urine and bile, cancerous poisons, &c., with as much confidence and certainty of result as we now administer mercury in syphilis, quinine in intermittent *kyâitis*, colchicum in gout and rheumatism, &c.

Specific remedies for malarial diseases or antidotes to malarial poison, as far as they are known at present, are quinine and arsenic, and the same for infectious *kyâitis* are, perhaps, wine and salts. The power of quinine in checking recurrent *kyâitis* and removing a susceptibility thereto, would be disputed by none, but opinions differ as to how such a desirable result is effected. It improves tone and strength by correcting weakness and debility like a tonic, but the tonics do not cure a recurrent *kyâitis* in every instance, although they may exert their full tonic influence. Again, the efficacy of arsenic in putting a stop to agues is as great and certain as of quinine, and yet we cannot call this a tonic. The anti-periodic virtue of quinine and arsenic, therefore, is something different from what we usually regard as tonic (*see my paper on action of medicines generally*).

What the nature of the anti-periodics, and such medicines as destroy the poison of *kyâitis*, and the modes of their operation are, must be, more or less, a matter of conjecture so long as we remain in ignorance of the real nature of malaria and the infectious poison of continued *kyâitis*. Judging, however, from the general history of *kyâitis* and its ordinary principles of treatment, we cannot help noticing some very striking points of resemblance between this disease and the phenomena observed in the vegetation of minute cryptogamic plants and infusorial animalcules. The marsh miasma may be supposed to consist of sporules of cellular plants, or simple minute living particles of living organic mucus, which, after imbibition, produce a succession of crops of those vegetables in the soil of the body, constituting the periodical *kyâitis*. In

the same manner, the infection of typhus may be viewed as composed of ova of animalcules, or *diseased particles of living animal matter*, which, being inhaled, infest the system by generating colonies of themselves in the rich and fertile blood, so as to develop kyâitis of the current type. This view of the probable nature of these poisons is strengthened by the following considerations. Thus, there always elapses a certain time before a miasmatic or infectious disease begins to manifest itself. This is what may be called the period of germination or incubation, during which the sporules, ova, or minute disease-germs may be supposed to undergo the necessary preparations before being called into active independent life in the cold and hot stages. This preliminary period is characterized by various undefined sensations of uneasiness, disinclination to food, sickness, laziness, restlessness, dreamy nights, &c. In the second stage or developed kyâitis, we have heat of skin, languor and lassitude, weakness and debility, diminution and perversion of secretions, &c. All these symptoms may be ascribed to the newly-formed thalogenes or animalcules, or simply extremely minute heterogeneous particles of living vegetable or animal matter, which not only irritate the capillary tubes to spasm, from which arise the hot and cold stages of the disease, but feed upon and corrupt the blood and the other animal fluids, causing scanty and imperfect secretions. In the third or typhoid or malignant stage of kyâitis, it is not improbable that while myriads of our parasitic guests have finished their growth, and are dying away and putrifying, others are fast springing into life to appropriate the spare nutritive juices, and to continue the concatenation of the malady till either by some artificial or natural interposition, they are expelled from the system, or the wretched host falls a helpless victim to the merciless intruding foe. The sordes, the increased foetidity of the secretions, and the alarming defective and perverted cerebral and spino-ganglionic discordances and accordances of the last stage of kyâitis may be also accounted for partly by the dead and putrid masses of parasites and partly by the still further degeneration of the blood.

The treatment adopted in the first two stages of *kyâitis* is calculated more to expel the parasites by freely opening the different outlets of the body than to destroy them by their appropriate poisons, unless tartar emetic and some salts are to be viewed as such. It consists in the employment of purgatives, bleeding, diaphoretics, and diuretics, &c. If an intermission occurs, as in recurrent *kyâitis*, we take advantage of it, and use such medicine as quinine, zinc, arsenic, and copper. The solutions of the last three substances we know will kill any vegetable when sufficiently watered with the same. Can the parasitic vegetation of intermittent *kyâitis* be an exception to this rule? It is very true that they are exhibited in very minute doses, but that can be no argument against their proving poisonous to the minute tender thalogenes fed by the animal juices and excluded from the air. If, instead of mere living matter, they consist of some independent low form of life, their almost homogeneous little cells must be more simple and softer than their congeners in the highly-endowed plants, and their life and vitality must be extremely sensitive and low in degree. It is, therefore, possible that a quantity of poison, which is scarcely felt by a plant or animal endowed with a higher and more complex and durable organization, may totally disorganize the lower fabrics of the minute cellular plants and animalcules. It may be asked, if arsenic, quinine, &c., are really such potential remedies against the incursions of cellular thalogenes and entozootic animalcules and other forms of minute living matter, why do we not apply them in all cases and stages of *kyâitis*. To this it may be replied, that in *kyâitis* it is not the cause alone we have to remove, but also the determination and congestion which constitute the affection, and which may destroy life independently of its remote or existing cause. This determination and congestion we are all aware are increased by irritating and stimulating substances, as arsenic, quinine, sulphate of copper, &c.; hence, if they are administered where there is any determination, they generally prove injurious by exciting more of that process which it is our object to reduce. They will not fail to kill the poison, but at the risk of a more serious determination

and congestion, and life would be exposed to a greater danger than if we abstained from them altogether. In other words, by replacing a simpler cause of kyâitis, we substitute one of a more formidable nature. The alkaline and acid drinks and salines are admissible in the first stages of current kyâitis (with greater determination than congestion), owing to their less stimulating qualities, and the improvement that follows may be partly attributed to their chemically corroding, or dissolving the hurtful parasitical cells or simple diseased living matter. In the third, or typhoid or malignant stage of kyâitis, however, no medicines have been found so efficacious as wine (alcoholic spirits generally), camphor, aromatics, &c. Cures have been recorded in which two, three, or more bottles of wine have been taken in 24 hours, not only with perfect impunity, but with every progressive amendment in the state of the patient. We cannot safely recommend these large potations in other diseases as of inanition and simple emaciation, as we do in typhus, and prostration from similar forms of excessive entozootic adulteration. It is, therefore, obvious that the alcohol thus imbibed does not at all affect the nervous system; there is no intoxication, no exhilaration, nor any great excitement of the pulse. Again, the same patients, when convalescing, will feel excited by a moderate dose of wine, showing that it is not weakness or debility which imparts an insensibility to free spirituous imbibition.

How is the immoderate consumption of alcoholic draughts by typhoid patients, then, to be accounted for? We cannot take for granted that it is decomposed and transformed into other compounds, which are either retained in the body as a constituent or discharged as an excrement. Such changes may occur, but they must be rapid, or the individual could not save himself from being drunk. The only way in which this anomaly, the apparent insensibility of the body to alcohol, can be explained, would be to presume a parasitic origin of kyâitis. If we allow the presence of parasites, we can easily understand their imbibing a greater part of the alcohol administered and dying of it afterwards,



for the spirit of wine is known to be positively destructive to all animalculæ or entozootic life. The consumption of alcohol thus effected must be very rapid in consequence of its diffusibility through the blood, and the quantity consumed must be enormous, owing to the countless myriads of parasites present with which it comes in immediate contact. A portion of the spirit of wine may also be supposed to act as an antiseptic, for it is one of the best disinfecting agents we possess, and the parasites must be all short lived and in a state of constant reproduction and decay, which may cause a good deal of putrid decomposition in the blood.

Indeed, the great impunity with which typhoid patients drink copious draughts of wine, and the progressive improvement in the symptoms that follows each draught imparts a strong support to the doctrine that the generality of the cases of idiopathic kyâitis arise from the inroad of parasites. Camphor, aromatics, ether, and chlorine have to a certain extent the same effect as alcohol; that is, they likewise act as stimulants, vermifuges, and antiseptics; hence they are often prescribed with various degrees of success. Mercury operates as an auxiliary to other remedies by opening out the emunctories of secretions and excretions. Those who have had ample opportunity of treating epidemic cholera would be able to recall to mind the beneficial effects of frequent exhibitions of moderate doses of brandy, mixed with ether, laudanum, camphor, &c. Quinine may be tried with great success; but without the addition of some stimulant or sedative stimulant, it will seldom produce the desired effect. We have no antidote for eruptive kyâites, which probably all originate from animalcules or *peculiarly altered living particles of matter*. From the circumstances of their occurring only once during life, we practise vaccination and inoculation as a sure prophylactic against small-pox. No such preventatives have been discovered against measles and scarlatina.

*Treatment of Venereal Adulteration.*—Antidotes for gonorrhœa are balsam copaiba, cubebs, Gurjon oil, turpentine, &c., and for syphilis, mercury, iodine, nitric acid, &c. They



aggravate the symptoms when used in acute determination in the same way as quinine, arsenic, and wine do harm in acute kyâitis. When the determination, however, is moderate, they may be given with every safety and certainty of success. For the same reasons, when they are exhibited in over-doses they prove mischievous, by adding to the intensity of determination. Narcotics, sedatives, diaphoretics, diuretics, and purgatives are to be combined with advantage. The local treatment consists of washes, injections, poultices, ointments, caustics, &c., which on no account are either to be slighted or neglected.

*Treatment of Rheumatic and Gouty Adulteration.*—We cannot say that we have yet a specific for gout, although many have been recommended and tried, from time to time, as such. There seems to be a superabundance of unsuitable azotized matter connected with the affection, which must be met by a liberal use of vegetable food, bodily activity, change of air, &c., and the ordinary remedies of congestion and determination should be had recourse to for the relief of the general and local symptoms.

We have more certain antidotes for the rheumatic poison, whatever may be its nature, in the combination of colchicum and alkalies. We have met with few cases in which this treatment failed to fulfil the desired end when judiciously followed.

On the other hand we have seen many instances where colchicum has been liberally given, yet the patients became cripples for life for want of circumspection on the part of the practitioner. The addition of narcotics, sedatives, purgatives, diuretics, &c., are necessary with a view to relieve symptoms and to prepare the system for a rapid cure. When the determination or congestion of rheumatism, however, runs into the productive stage, or is already encumbered with products, or involves important organs, as the heart and pericardium, our indications of treatment are the same as in ordinary productive congestions and determinations. Hence we use bleeding, sedatives, purgatives, alteratives, relaxants.

Mercury should be greatly depended upon in such cases, and if resorted to early and with caution, will seldom fail to effect the objects of its administration. Excess of vegetables, fruits, acidulous meals, and an unguarded exposure to cold and extremes of temperature should be always avoided.

*Toxicological Adulteration* should be treated by neutralization, or by removal of the poison from the primæ viæ, as by chemical antidotes, emetics, and stomach pump, and by the counteraction of the effects already produced by it. For a detail of these several measures reference must be made to works on toxicology. Animal poisons, as in snake or dog bites, require suction, excision, or destruction of the parts bitten, by actual or potential cautery. The one or other of the two latter proceedings should be had recourse to in every instance, or the case will be more likely to terminate fatally.

*Accidental Adulteration*.—Nothing can be done in cases of complete suppression of urine and bile, and the saturation of the blood with pus or the germs of malignant diseases, as in phlebitis and cancer. Patients affected with those states must necessarily die, until our knowledge of antidotes is further advanced. In the incipient stage of malignant growths a cure may perhaps be effected by complete excision, and afterwards good nutrition and careful hygiene.

The different varieties of asphyxia are to be treated according to their several causes, and if these be removable, and assistance could be procured in time, a recovery could easily be guaranteed; but the circumstances being reversed a fatal issue can alone be looked for. The main object in the treatment of asphyxia, is to restore those conditions to the respiratory apparatus, its muscles, nerves, bones, vessels, and contents, by which the aëration of blood is usually accomplished. These conditions it is not within the present scope of this treatise to discuss, and for them let the student consult more appropriate works. The tumours and other abnormal growths should be treated by pressure, excision, deligation, proper regulation of diet, exercise, &c.

## CHAPTER III.

## EMACIATION.

EMACIATION is that gradual wasting or decay of the body which is generally the result of some more or less protracted cognizant disease. In it all the solids as well as the fluids suffer; it affects the blood, the nutrition, and secretions, and the nervous functions, which it variously changes. The solid structures generally become attenuated, the bones project, the hollows deepen, and the specific weight of the body goes on daily decreasing. It presents the most painful and helpless spectacle of life. The face looks ghastly pale, shrunk, and bony; the eyes dull, leaden, and stupid; the nose shrivelled up; the hair dry, stiff, and deciduous, perhaps falling off, lock after lock, and a most heart-rending expression of distress, sadness, and vacancy pervades the whole countenance. The limbs, no longer plump, are powerless, and lay in whatever position they are placed, faintly subservient to the will, and the efforts to move from side to side or to sit up in bed, would seem to require a herculean effort. The abdomen is flat and boat-shaped, or thin, shining, and distended from within, with long, tortuous, prominent veins coursing along its smooth surface, the spinous processes and the ribs are easily countable, and the very slightest impulse of the fluttering heart is sometimes perceptible at a distance; the mouth and tongue are either too moist or dry, sometimes coated with thick sordes or fur, emitting a most disgusting fœtor. There is either a disgust for food, or a craving for that which is filthy and unwholesome. The stomach is powerless, the digestion weak and depraved, and the secretions and excretions are generally diminished and perverted, or, it may be, completely suspended. The patient is easily fatigued by mental exertion, perhaps stupid and frequently casts about a stare of

listless despondency not unlike that of confirmed fatuity; with this exception, that the sentient being here has still a rational stamp about him, although the sentient faculties are almost reduced to their last workable condition. The blood is impoverished, thin, and watery, there is probably less saline matter. The red particles are certainly few and scarce, and the plasma of the blood is almost rendered aplastic. The fluids acquire a tendency to pass in and out through the coats of vessels and tissues according to the general laws of nature and not those of organic life; hence the œdema, puffiness, and sanguineous turgescence of the resistless depending parts. The spino-ganglionic sense is brought down many degrees below the level of health, whence result languor and lassitude, weakness, and debility, inappetency and perverted thirst. Contemporaneously with these, goes on the loss of flesh or wasting, and such is the consumption of animal matter in some cases, as in *kyâitis* by the requirements of the countless parasitic invaders of that disease that breed and feed upon the resources of the body, that a few days, nay, even a few hours in some cases, will suffice to strike down the strongest and stoutest frame to a skeleton of hollow cheeks, sunken eyes, blue contracted fingers, &c. How often do we observe a fit or two of ague, an attack of cholera, or any *kyâitis* of a parasitic origin, prostrate a man for days together, just as the voracious locusts, in no great lapse of time, sweep away the vegetation of a province or country, and cripple its resources for a long while to come. We ordinarily call the state of the body consequent on such a visitation the shock of an ague, shock of cholera, &c., which, to interpret rightly, is the effect of devastation and plunder of the animal frame by the countless invading parasites. Owing to the greater consumption and perversion of animal materials in *kyâitis* of a parasitic origin, we find more languor, lassitude, weakness, and debility in this than in other determinations and congestions, which are free from parasites, such as hepatitis, pleuritis, splenitis, &c., in which the drain is by no means so rapid or universal. Emaciation is a disease of the whole body, caused

partly by inanition and partly by adulteration, or we may say it is a compound of inanition and adulteration. In it we not only observe the body being poorly fed, but it is more or less saturated or infiltrated with poison either external, as malaria, infection, &c., or internal, as suppressed or retained urine and bile and other secretions. It may therefore be divided into two varieties, viz., one in which inanition predominates over adulteration, and the other in which the latter exceeds the former. Inanition predominates in the emaciation of rheumatism, frequent hæmorrhages, dropsies, &c., and fluxes, rickets, phthisis, &c., and adulteration in the wasting of idiopathic kyâitis, exanthemata, diffuse phlebitis, &c. Kyâitis seldom terminates or continues long without inducing some emaciation, the peculiarity of which is the excessive depression of the nervous system or defective spino-ganglionic accordance, or as it is sometimes called adynamia, and the rapidity with which this depression is brought on. In exanthemata the emaciation is of the same kind as in common kyâitis, but it is seldom so great and so easily produced unless there be some complication accompanying or succeeding the disease, as the secondary kyâitis of small-pox, disease of the mucous membranes in measles, and of serous membranes and Bright's disease, as in scarlatina. In rheumatism and gout emaciation is brought on very slowly with more inanition than adulteration, and there is excessive sentient accordance. The emaciation of syphilis and gonorrhœa is also of slow production, and in proportion to the quantity of the production their determination or congestion may yield. The wasting of cancer proceeds from the extent and bulk of cancerous degeneration, and is attended with excessive and perverted sentient spino-ganglionic accordance of the parts affected. It gives rise to perverted nutrition, especially of the bones, which become brittle and fall to pieces by the least violence. In rickets the reverse appears to be the case, the bones growing soft and pliant.

Common determination or congestion of parts not very important to life, as of the limbs, skin, cellular tissue,



lymphatic glands, &c., when protracted and extensive, causes slow wasting more by inanition than adulteration. Of those, however, essential to life, as of the liver, kidneys, alimentary canal, heart, lungs, brain, &c., emaciation is more obvious when these organs are partially and slowly diseased, so that the animal functions might still go on, though languidly and imperfectly. If the whole of any of these organs be affected, emaciation is generally slight, and death is to be attributed to the sudden interruption of functions and the consequent enervation.

When a vital organ suffers from disease or some defect of constitution for some time, so as to necessarily lower and degrade digestion and nutrition, one most general consequence that must sooner or later arise will be the poverty of the blood. There is fibrin, but the greater part of it no longer possesses its natural plasticity; it is inferior in quality, and consequently ill suited to nutrition.

It is brought in contact with the tissues, but it is, as it were, refused by them, being unserviceable and useless; the consequence is, that while the body is imperfectly fed the blood is surcharged with animal matters which we cannot consume, owing to their failing to afford that due support which we obtain by assimilation of proper nutritive elements. Instead of appropriating such degraded lymph, nature endeavours to get rid of in the best manner it can, and we find it being now deposited in the weak, unresisting tissue of the lungs (phthisis), now on the surfaces of membranes (as in some cases of empyemia), and now thrown out interstitially in the different organs—in the liver (nutmeg liver), in the kidneys (Bright's disease), in the mesenteric glands (tabes mesenterica, &c.). The poor lymph thus diversely excreted, and which acts as a constant adulteration, and through it causes emaciation, proves mischievous, not only by its chemico-vital changes into softening and pus, but also by its mechanical properties of weight, pressure, distention, contraction, &c.

*Diagnosis and Prognosis of Emaciation.*—The diagnosis

will consist in finding out the kind and nature of adulteration, and the proportion the latter bears to inanition, for emaciation supposes a combination of adulteration and inanition. If the adulteration is intense, life is extinguished before any visible wasting could occur, as in confluent small-pox, plague, asphyxia, cholera, Bombay fever, suppression of urine and bile, &c.

Generally speaking, emaciation is not so fatal a state of the sick as simple adulteration or inanition, although from its being a more extended disorder, its mortality is proportionally greater. This circumstance is to be attributed to the fact that while it allows, by its slow progress, a full scope to the *vis medicatrix nature* to counteract its general tendency to death, it affords ample opportunities for the employment of artificial auxiliaries. The prognosis is always unfavourable when any of the two elements of the disease is excessive, viz., inanition or adulteration, so that our treatment cannot be pushed on with that promptitude and vigour which such cases demand.

*Treatment.*—We have to combat two conditions of the system in emaciation, viz., inanition and adulteration. Hence our measures are to be directed not only to improve digestion and promote healthy secretion and nutrition, but also to free the body of its various impurities. In other words, our treatment should be both alimental and antidotal. The remedies known as alterative tonics are, also, here peculiarly indicated. The regulation of diet is a most important consideration in all cases of emaciation, and one in which much practical knowledge is often necessary. More harm is done by the administration of injudicious and ill-timed food than even by a temporary abstinence from it, and not unfrequently the best directed remedial measures are frustrated by neglect, indiscretion, or indifference to this point. The greater the wasting, the more need there is to supply the sick with aliment, but in doing so we must always keep in mind the alarmingly low condition of the alimentative organs in emaciation, viz., those of digestion, circulation, and nervous

function. Much discrimination is, therefore, requisite in selecting the kind, quality, and quantity of food that would be adapted to those several states. In emaciation from *kyâitis*, besides quinine, arsenic, wine, and other substances, which, as we have before shown, probably act as antidotes to malaria and infection, we ought never to neglect the administration of proper unirritating, nourishing food. It should be at first liquid, as sago, arrowroot, soup, broths, beef-tea, &c., and given in a few spoonfuls at a time; by-and-bye, more consistent and solid food may be allowed, consisting of meat, rice, &c.; all greasy things ought to be generally avoided, as difficult of digestion, the addition of wine is a most advantageous practice, and constitutes one of our best diets in emaciation. Wine, perhaps, partially serves as food, and supplies the elements of organic combustion, the source of animal heat. There are some cases of intermittent *kyâitis* now and then met with, especially in India, in which the body is worn down to its last stage from long continuance of the attack. The disease, although it had originated from malaria, is afterwards kept up, as it were, by a habit of periodical determination to the skin, the poison having probably long died away. These patients generally come from great distances in the interior to our towns in hopes of obtaining aid from European skill; they are readily admitted into hospital, and the physician, to show how potential and certain European remedies are, compared to indigenous drugs, at once has recourse to quinine. The *kyâitis* is got rid of, but the patient dies immediately after, or lingers for a few days between life and death, although with the *kyâitis* on he had previously lived for weeks together. Death is generally assigned to extreme depression of the vital powers, and so it is, but we do not know through our prejudice what gave the mortal tendency to the extreme depression. Before the patient came to hospital, the habitual determination was the only stimulant he had to save him from the extreme general emaciation and congestion, it was the only means by which life had hitherto been pro-

longed, and the quinine, by depriving him of this beneficial stimulation, robbed him of the life he had so long held in virtue of that timely reaction in the system.

The rational physician, therefore, would rather gradually increase that determination at first than help to extinguish it. Food and wine are all the remedies required at the outset, and after the strength and tone of the patient are sufficiently improved, a few doses of quinine or arsenic as a tonic or alterative, may subsequently be employed with happier effects.

The same plan of treatment applies to emaciation from exanthemata. As in these diseases there is a great tendency to local productive congestion and determination; care must be taken not to administer too soon and too liberally the remedies of emaciation when accompanied or followed by such affections. The remedies for emaciation of rheumatism, gout, gonorrhœa, and syphilis, are proper regulation of food and the exhibition of colchicum, balsam copaiba, cubebs, mercury, &c. The alterative tonics are often of great service in these cases, as hydriodate of potass and nitric- or nitromuriatic acid with a vegetable bitter. Iodide of iron, chloride, and oxides of gold, &c.

The same and similar medicines are no less urgently called for in emaciation from local determination and congestion generally. In phthisis, nutmeg-liver, granular disease of the kidneys, our attention is too exclusively drawn to the seats of those affections, overlooking the fact that they are not unfrequently the result of a general unhealthy condition of the system, which requires, first of all, to be remedied if possible. The cough medicines, diuretics, chologogues, &c., with leeches and blistering of the respective surfaces, would alone never effect a cure, but the general condition being improved, the local disease will give way also, and if tubercular deposition has already taken place, it will be either removed by absorption, or, at any rate, be prevented from doing further mischief, and life would still go on, if not with its native energy, with a vigour not far

under it, perfectly compatible with our ordinary enjoyments. In fact, in these cases what may be called the *plastic* or *fibrine nutrition* becomes alarmingly defective, and our best endeavours should be directed to raising it to its healthy standard. As in ordinary adulteration, cleanliness of person and surroundings, fresh air, good water, due regulation of temperature, change of scenes and climate, and pleasant excitement where available, are proper things to be always attended to, in addition to other measures.



## CHAPTER IV.

## ENERVATION.

WE apply the term enervation to the state of the body consequent upon diminution or deficiency, or extinction of the nervous and mental powers by disease or accident. It may, in other words, be defined as a gradual defect or sudden failure of the cerebral, spinal, and ganglionic accordances (motor and sentient) respectively, or mixed in different proportions, or of them all at the same time, and may be supposed to resolve itself fundamentally into three varieties, viz., *firstly*, that in which enervation is more or less fixed or settled; *secondly*, that in which it is progressive; and *thirdly*, and *lastly*, that in which it is sudden and instantaneous.

Examples of *fixed* or *stationary* enervation are such as that of chronic mania, that of chronic fatuity, natural blockheadedness, apathy, melancholia, paralysis of sensation and motion; those of the progressive kind, such as adynamia of kyâitis, defective accordance of various other diseases of congestion and determination, depression resulting from chorea, epilepsy, hysteria, hydrophobia, tetanus; and *lastly*, those of *sudden enervation*, as death by lightning, death by a blow in the pit of the stomach, and by hydrocyanic acid, concussion, compression, syncope, &c. For a detailed account of these several instances of enervation, the student must refer to standard treatises on those subjects; all that we can at present do is to offer a few general remarks on them.

In fatuity there is a perfect unconsciousness of the external world, and perhaps almost of the personality itself, so that the mind is a hopeless blank throughout. It is the very opposite in melancholia, in which the mind is, as it were, overgrown with a thick and gloomy herbage of the most sensitive description that crisp and curl, and sometimes swell out into the most fantastic forms on the least unusual perturbation of

morbid feeling. Apathy is a partial blindness of the mind, and stupidity, a rockiness of the individual, on which nothing can make an impression. Hence stupid and dull persons exhibit comparatively so little suffering while labouring under any corporeal disease, and they may again become thin or grow stouter and thicker in spite of themselves. In paralysis, enervation reaches to a state of cheerless resigned vacancy; indeed the very look of the paralytic is full of pity, tedium vitæ, and despondency.

The student is well acquainted with the adynamia of kyâitis, and the langour and lassitude, and weakness and debility of other forms of protracted determination and congestion; their chief characteristic is that their enervation is progressive.

Many cases of tetanus and hydrophobia lead to death by exhaustion following long-continued violent exertion of muscles.

We do not know how sudden enervation takes place, as when an individual is struck by lightning, beyond that it is produced by a violent shock.

Enervation from disease must give rise to and accompany many changes in the state of the solids and fluids. In the fatuitous there is always something defective or wanting; his bowels are either costive or loose, he is either fasting or eating dirt, or consuming more food than is required, &c. In the hypochondriac stage there is more or less disorder of the chylopoetic organs, and consequent poverty of the blood and emaciation. The state of the body in the adynamia of kyâitis, and the enervation of specific and ordinary determination and congestion, is too well known to the advanced student to require further analysis in this place. In sudden enervation the blood is said to lose its powers of coagulation, and that there is no cadaveric rigidity after death. This, if universally so, would tend to show that the resident sense of living tissues, on which their contractibility is dependent, is totally extinguished by a stroke of lightning also by shock from a blow in the pit of the stomach.

Enervation is generally more or less complicated with the other recognisant diseases, but nevertheless it cannot be easily mistaken for any other general state of the body.

*Prognosis.*—I need scarcely say that sudden enervations prove, with few exceptions, always fatal. The fixed and progressive varieties, however, continue favourable as long as they are not much complicated with emaciation, which sometimes encroaches rapidly, when death inevitably soon closes the scene. Generally speaking, in such diseases as kyâitis, rheumatism, gout, syphilis, gonorrhœa, anæmia, &c., our prognosis of enervation is more favourable than the same in chorea, epilepsy, paralysis, insanity, &c.

*Treatment.*—Besides the appropriate measures for counteracting any degree of emaciation that may be present, enervation requires what are usually denominated stimulants and irritants, or rather counter-irritants, as they are usually called, such as wine, heat, cantharides, &c. The stimulants may be classed under three heads, viz., *medicinal*, as alcohol, ammonia, carminatives, &c.; *hygienic*, as fresh air, change of scenery, climate, &c.; and *mental* or *rational*, as pleasant society, hope, reasoning, congenial discourse, &c. All these are resorted to with considerable benefit in fatuity and melancholia. Wine is found most useful in kyâitis and exanthemata, and also in other cases of enervation, as in exhaustion from hæmorrhage, especially in the puerperal floodings. Strychnia and nux vomica have been proved to be excellent excitants of muscular action, and hence their general adoption in the treatment of paralysis. Blisters and cauteries act kindly by raising sensibility. Moderate graduated heat will do the same, as in enervation from excessive cold.

## CHAPTER V.

## HYPER-INERVATION.

WE might with propriety recognise another general morbid condition of the system, besides the four we have endeavoured to describe in the foregoing chapters, viz., the condition sometimes observed in the generally too exalted manifestations of the whole animal, so to speak, such as is evidenced in the occasional exuberant energy and liveliness displayed in some sthenies of the sanguine temperament, the same persons in passionate excitements and rage, the extraordinary activity of the acute maniac, also in some cases of monomania, in the religious enthusiasm and enthusiasm generally, in the obstinate blind faith and prejudice in individuals who in all other respects are sound and whole, &c. We shall call this state, morbid excessive innervation, or morbid *hyper-innervation*.

The diagnosis, prognosis, and treatment will be according to the nature and stage and cause of the particular morbid exaltation under the care of the physician. Keeping always this in remembrance, however, that here the mind is more or less the chief ruling factor in the disease, and hence the propriety of the designation we have made use of, *hyper-innervation*.

The hypernervines, as the unhappy subjects of this disease may be called, do not often die directly of their state, but generally either by exhaustion or by some irrational acts which they are driven to commit, and thus they fall either by accident or by their own hands, or by that of the executioner. Our measures will therefore be indirect, and more to guard against prospective danger than directly

to battle with the enemy. Education, morality, sense of God and religion, will have to be brought, among other things, to shed and impress their holy influences on these unfortunate hypernervines. In many cases divine help and grace are their last refuge and hope.



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